



Silver Linings

The implications of BREXIT for the UK Data Centre Sector

October 2016

Emma Fryer
October 2016

Foreword



The outcome of the UK Referendum on EU membership signals a number of fundamental changes to our political and economic landscape, and we now face a period of uncertainty that presents some challenges for our sector.

Data centres provide the core digital infrastructure that underpins our modern economy; all sectors – business, government and academia – rely on our facilities to transmit, store, process and manage digital data. As individuals we rely on data centres to work, to interact with government and, increasingly, to socialise.

But the data centre is not just a modern utility; it supports a complex, dynamic and highly successful ecosystem of businesses. Collectively these have made the UK a globally important hub for the provision of digital services: the UK punches well above its weight and enjoys a significant trade surplus in digital exports, especially to the rest of the EU, which represents 40% of our market.

The UK's relationship with the rest of the EU is now set to change, and we need to protect the mutual arrangements that give us access to the world's largest market. For data centre operators, and in particular their customers, ensuring that data can continue to flow between the UK and the EU will be critical.

This report sets out our position, the opportunities and challenges for the sector and the actions that we think are needed.

Andrew Jay, Chairman, UK Council of Data Centre Operators



We certainly live in interesting times. Sitting between the policy making machines of London and Brussels and a highly technical sector that few outsiders understand, I thought my life was pretty complicated. It was: I have spent the last five years dealing with issues ranging from generator emissions compliance to cyber security, taking in *en route* climate change, data protection, data sovereignty, energy costs, security of supply and physical resilience.

Now we need to revisit all these issues in the light of Brexit, but until we know the form that our future relationship with Europe will take, we are to some extent in limbo. That is why we have taken the proactive step of setting out the potential threats and the opportunities that Brexit presents for us and defining the actions we think are needed to help us address these threats and exploit these opportunities.

When people ask me what the impact of Brexit will be on the sector my answer is “it depends”. It depends on Government, because intelligent and timely policy actions can make a huge difference. It depends on us – firstly how well we prepare as a sector and secondly how clearly we articulate our needs. We will indeed be preparing for change both at sector level and as individual operators. This report is our initial attempt to address the second point – to articulate clearly what we need.

Emma Fryer, Associate Director, techUK

Abstract

This paper explains the role of data centres in the economy, how they provide the core digital infrastructure that underpins all industry sectors and enables our digital economy. It sets out the challenges and opportunities presented to the sector by Brexit, examining the impacts in seven different policy areas relevant to the sector: uncertainty, data flows, trade, skills, energy costs, inward investment and environment. It then outlines the policy actions that are needed to help us address those challenges and optimise those opportunities.

Contents

1. [Executive summary](#)
 - 1.1. [The UK data centre sector](#)
 - 1.2. [Data centre Brexit dashboard](#)
 - 1.3. [Policy priorities](#)
2. [Introduction](#)
 - 2.1. [Er, what IS a data centre?](#)
 - 2.2. [Why do we need data centres?](#)
3. [Why are data centres economically important?](#)
 - 3.1. [Direct contribution](#)
 - 3.2. [Indirect contribution](#)
4. [The UK sector: a global success story](#)
 - 4.1. [Why is the UK such a hotspot for data centres?](#)
 - 4.2. [Box 1: fast facts](#)
5. [Market reaction to Brexit](#)
6. [Threats and opportunities](#)
 - 6.1. [Uncertainty](#)
 - 6.2. [Data flows and data protection](#)
 - 6.3. [Trade](#)
 - 6.4. [Skills](#)
 - 6.4.1. [Box 2: Hard to source skills for data centre operators](#)
 - 6.5. [Energy costs](#)
 - 6.6. [Inward investment](#)
 - 6.6.1. [Box 3: Inward investment checklist](#)
 - 6.7. [Environment and climate change](#)
7. [Summary: policy actions needed](#)
8. [Contacts and links to further information](#)

1 Executive summary

1.1 The UK data centre sector

Data centres provide our core digital infrastructure, underpinning all economic sectors, and are the agents of growth for the knowledge economy. Data centres enable and power service economies in the way that heavy industry used to power manufacturing economies. The UK data centre sector is a global success story that disproves the traditional view that nation building industries must produce physical goods rather than services.

The UK data centre sector is globally important: the commercial London market is the second largest in the world and dominates the European market. This did not happen overnight; benefiting from first mover advantage and a demanding customer base, it has developed over the last 18 years into a complex, diverse and successful business ecosystem. This enables the UK to punch well above its weight in the provision of digital services worldwide and makes the UK a perfect platform for multinational businesses to access the rest of Europe.

The result of the EU Referendum has significant implications for UK data centres because a change in our relationship with the rest of Europe inevitably signals political, economic and regulatory uncertainty. In particular the mutual arrangements regarding data flows, trade and skills, on which our businesses and more importantly their customers depend, are no longer guaranteed and may have to be renegotiated.

1.2 Data centre Brexit dashboard

The risks we think Brexit poses to the data centre sector are set out in order of severity using the dashboard below. The coloured spectrum indicates, from our perspective, the potential for opportunity, increasing from red to green. Section 6 of this report, on risks and opportunities, takes each of these issues in turn, explains why they matter to the data centre sector and sets out the actions needed to minimise a Brexit related threat. Where we think opportunities may exist, we identify them and suggest the actions needed to realise them.

THREAT	UNCERTAINTY	DATA FLOWS / DATA PROTECTION	TRADE	SKILLS	ENERGY and COMMODITY COSTS	INWARD INVESTMENT	ENVIRONMENT & CLIMATE CHANGE	OPPORTUNITY
What is the risk?	Paralysis, planning blight. Loss of FDI. Offshoring, relocation, attrition	UK deemed inadequate as data host. Restrictions on data flows to EU. Offshoring, relocation, attrition	Exclusion from trade agreements. Tariffs on physical goods. Non-tariff barriers on services.	Acute skills shortage, especially technical skills. Operational and business risk. Constraint on expansion.	Increased operating costs. Failure to compete.	Loss of FDI. UK competitiveness damaged. Relocation.	Competitive disadvantage. Burdens without benefits	What is the risk?
How do we mitigate this risk?	Immediate high level commitment to protect data flows and trade in services.	Adequacy. Legal clarity.	Single market access	Free movement of skills. Review Tier 1 & Tier 2 criteria. Protect non UK employees.	Protection from high energy costs and non-commodity energy costs	Explicit support for sector. Bespoke incentives. Practical help for FDIs	Equivalent standards and targets but greater freedom in how they are achieved.	How do we mitigate this risk?
Can we turn this into an opportunity?		Parity = success. Simplified GDPR possible in theory but unlikely in practice.	Parity = success. Limited scope for additional third party trade agreements.	Opportunity to rethink migration rules and access a wider pool of international talent.	Better support for priority sectors freed from constraints of State Aid Rules.	Scope to radically upgrade the UK's offering. Incentives can be targeted where they will be most effective.	Unprecedented opportunity to review and streamline a burdensome array of policy measures	Can we turn this into an opportunity?

Although our departure from the EU is not likely to happen until 2019, the sector started to feel the implications as soon as the result of the Referendum on 23rd June was known. This means that policy actions need to be implemented at a speed that is entirely uncharacteristic of the normal policy development process.

As businesses we need to be agile, to be adaptable and evolve to find new commercial niches in this changed environment - and we will be. However, we are not free agents: we operate within a complex set of regulatory and other policy constraints. So we also depend on government to demonstrate similar agility in making policy decisions and in implementing them with real urgency.

1.3 Priorities for government action

Data centre operators and service providers have identified the following policy priorities for government:

1. **Uncertainty:** Provide an immediate undertaking that government will protect data flows, implement GDPR equivalent and prioritise single market access. At this stage, making intentions clear before acting is infinitely preferable: Uncertainty is damaging, so telling us what you are going to do and then doing it is much better than doing it and then telling us afterwards.
2. **Data flows / Data protection:** Provide an urgent undertaking that UK data governance laws will be adequate for compliance with EU and global requirements so that UK operators and their global customers can continue to host, manage, process and transact EU and other national data in the UK. Work must then start on developing a comprehensive international data transfer solution (in and out), an equivalent to GDPR and an outcome on investigatory powers that meets global privacy standards while not affecting legitimate law enforcement and interception.
3. **Single Market:** Provide an undertaking that access to the single market will be a priority in negotiations so that UK operators and their global customers can continue to export digital services to the EU without trade barriers or non-tariff barriers.
4. **Skills:** Provide an urgent undertaking that the UK will be open to free flow of skills and that non British EU employees, on whom we depend for technical and other essential roles, will be protected. Redesign existing immigration policy and replace it with a skills based migration policy.
5. **Energy costs:** Mitigate energy prices by reducing non-commodity energy costs: Facilitate access to compensation for RO/FiTs/CfDs. The UK needs a simpler and more consistent way to identify energy intensive businesses. Current arrangements are complicated, targeted at mitigating industrial decline rather than protecting growth, and are inadequate.
6. **Inward investment:** Make a stronger case at Government level to support inward investment in the sector. Be explicit that the sector is valued and welcome. Upgrade incentives and target them more effectively. Smooth the runway so that investors are not beset by unnecessary obstacles. The UK can no longer rely on its first mover advantage and must provide a compelling prospectus along the lines of nation state governments in competing markets (Netherlands, Germany, Ireland and Scandinavia).
7. **Environmental compliance:** Retain environmental targets and standards but review energy and carbon taxes. Streamline existing approaches and abolish instruments that are ineffective or unduly burdensome. Delay target renegotiations for the CCA until there is greater clarity on the impact of Brexit on occupancy rates. Remember that the starting point is a clean sheet.

2 Introduction

While we have opted to leave the European Union, we do not yet know the form that our future relationship will take. All we know is that it will change. For at least the next two years we remain part of, and governed by, the EU so in one respect it is business as usual. In other respects the outcome of the Referendum on 23rd June signals seismic changes in our economic and political landscape. How we as a sector and as a country handle these changes will profoundly influence our collective future.

The technology sector did not support a Brexit and now the mutual arrangements that gave our businesses access to the world's largest market are uncertain. Many will have to be renegotiated. In the meantime, this uncertainty is damaging in itself so it is critical that we are clear about our position and our requirements.

Our position is simple: we remain open to the free flow of data, to the free flow of skilled labour, to collaboration and cooperation. Brexit presents us with both risks and opportunities and urgent policy action is needed to help mitigate those risks. Longer term measures will be necessary to enable us to realise those opportunities. Our position, our priorities and the actions we need policy makers to take are set out below and will direct our dialogue with government.

2.1 Er, what IS a data centre?

Data centres store, manage, process, receive and transmit digital data at scale within secure, specialised, resilient buildings. A data centre consolidates any number of separate IT functions within a single operating unit, delivering economies of scale, improved performance and efficiency. In plain English a data centre is a building filled with lots of computers talking to lots of other computers elsewhere.¹

There are around 500 data centres in the UK. Roughly a third of these are colocation (commercial) facilities, operated by companies like Equinix, Pulsant, DigitalRealty, Global Switch, Virtus, etc. A third support ICT service providers (like IBM, BT, Atos, Fujitsu, HPE) and a third are "in house" directly supporting corporate IT functions for all sorts of organisations like universities, banks and supermarkets.

2.2 Why do we need data centres?

If we want to live connected lives then we need data centres. If we want to bank, shop or socialise online then we need data centres. If the UK wants to be a net exporter of digital services, then we need data centres. Data centres represent our core computing utility, underpinning all economic sectors.

Twenty years ago there were no data centres – or at least none as we know them today. That's probably because there wasn't enough digital data to create a requirement for specialist facilities in which to house and process it, and the data that existed did not underpin enough critical government, business or social functions to make protecting it such a key priority. So the growth of data centres is the result of our increasing reliance on computing and on digital technology generally. More and more of our everyday processes, including government services, business processes, shopping and socialising rely on computing to function. The growth in data centres is also the result of changes in the way that we handle our computing – our increasing tendency to consolidate IT resource in purpose built facilities rather than keeping it on individual company premises in server rooms and cupboards (known as "distributed" IT).

¹ A data centre can be characterised as a building (or self contained unit) that primarily houses computing equipment, plus telecommunications, network and storage systems. It is equipped with a guaranteed and resilient power supply and high bandwidth connectivity. It will have sophisticated security systems and building management controls to maintain required operating conditions (temperature and humidity) for the equipment it houses. Data centre functions are performed by servers (computers that are usually assigned to specific roles as opposed to personal computers, which are more generic). For more detail see "Er What is a Data Centre?"

3 Why are data centres economically important?

Data centres underpin an internet economy that contributes 10% of UK's GDP, is estimated to contribute £225 billion to our economy and is growing at 10%, faster than any other country in the G-20². Despite being relatively new additions to our urban landscape, data centres are a fundamental – but often unrecognised – part of our critical national infrastructure. Data centres underpin an incredible range of activities across government, business and society and are now part of our lives whether we like it or not. We have to face the fact that our digital economy and our highly networked society rely on data and connectivity being managed securely and efficiently. Data centres improve competitiveness and drive growth in an astonishing range of businesses. They are the agents of growth for the knowledge economy.

3.1 Direct contribution

The UK data centre sector is a major business success story in its own right, is leading-edge in terms of technological development and is globally important. Due to the accelerating demand for digital data the UK data centre sector has continued to grow even during periods of recession, generating employment and revenue. The London market is the second largest data centre cluster in the world and dominates the European data centre market with 43% of the Tier 1 capacity³. The sector is a significant exporter of digital services such as data hosting, processing, transactions and storage to customers around the world, and acts as the entry point to the rest of Europe for many global data-dependent businesses. The UK sector also exports expertise in construction, engineering and training plus investment, brokerage and other professional services.

3.2 Indirect contribution

The critical economic contribution that data centres make is not direct. It is indirect: the sector provides the core infrastructure that underpins our digital economy. Data centres do two things: they stimulate a complex, high value-add supply chain and they enable multiple layers of economic activity⁴.

Stimulating the supply chain: Building or commissioning a data centre is eye-wateringly complex and expensive. A modern data centre can cost over £100M to build and fit out. Each element of financing, planning, design and construction needs specialist skills, and that is even before it is operational. As a result data centres generate a complex supply chain and create demand for a wide range of specialist services in multiple economic sectors, from engineering to planning consultancy, from security fencing to publishing. In London alone the commercial carrier neutral (outsourced) market represents over £2bn of investment just for the build and fit⁵, and data centre build represents a significant part of the UK construction industry in terms of value.

Enabling multiple layers of economic activity: While the basic data centre offering is secure technical space with guaranteed power and connectivity (sometimes known as “position, power and ping”) this is just the basic underlying infrastructure. Customers lease this space from operators in order to service their clients, who in turn may provide services to their own customers and so on. Services range from re-selling space to providing an end to end IT service. In this way a single data centre can provide IT functions for hundreds or even thousands of businesses; improving productivity and generating employment and growth within its customer base.

² Boston Consulting Group 2013, The 4.2 Trillion Opportunity: The Internet Economy in the G-20

³ Largest global data centre clusters – colocation (commercial) facilities. Tier 1 means the four key European markets: London Frankfurt, Amsterdam and Paris. See Fast Facts for more information.

⁴ See Data Centre Engines of Growth and Data Centre Business Models: The Sherry Trifle <http://www.techuk.org/insights/reports/item/278-data-centres-engines-of-growth-combined>

⁵ CBRE estimates that the commercial London carrier neutral market (pure colocation providers excluding telecom operators like BT, Level3, etc) represents a build investment of approx £2.2 – 2.5 billion. Although this is a small sub-set of the total UK data centre market it is one for which good data exists and it acts as an important barometer for the wider UK sector. CBRE provides a quarterly European Data Centres MarketView report

4 UK: Global success story

4.1 Why is the UK, especially London, such a hotspot for data centres?

Why indeed? In short it is due to a combination of factors, including connectivity, first mover advantage, critical mass, a demanding customer base, regulatory and legislative stability and availability of skills.

"the largest city in Western Europe, London is also the most cosmopolitan and diverse in terms of IT service providers. It offers an ideal base for local, regional and international firms to provide colocation, hosting and cloud services to the rest of Europe, while providing an ample mix of financial, public sector, technology, media and professional services customers"

451 Research, 2016

The UK in general and London in particular have long been destinations of choice for global data centre operators and technology dependent organisations to establish European headquarters or footholds from which to access the European market. In fact the UK has attracted more footloose inward investment of this kind than any other country in the world⁶. The UK sector is also exceptionally good at what it does; operators specialise in being market leaders in particular offerings. Competition has driven R&D in technology development and energy cost has driven a strong focus on energy efficiency.

Critical mass: The UK benefited from first mover advantage and from a critical mass of demanding customers who stimulated a leading-edge response from their service providers, especially in London. Over the last 20 years the sector has co-evolved with the financial services industry, the IT services sector and creative industries (music, TV and film, particularly animation). Around this concentration of activity suppliers, customers and a range of professional and advisory services have congregated and flourished. The result is a complex and thriving ecosystem of customers and suppliers that sets the UK market apart⁷.

"London currently accounts for 43% of the colocation data centres in the main European cities which underlines its strategic position. It has taken London over 18 years to create this complex technology ecosystem which is an enabler for the tech sector and wider business, especially financial services".

Andrew Jay, Executive Director, CBRE

Skills: The UK has a relatively flexible labour force with high levels of expertise. As the dominant European market with the best career opportunities it has acted as a magnet for the best technical and specialist skills from across Europe and beyond. The UK has world class expertise in sector investments, finance, funding, innovative design, engineering and construction, technical brokerage and procurement, a vast range of specialist operational and management skills from cyber security to energy stewardship, plus everything else in between. It is no coincidence that London hosts the world's largest data centre advisory team or that the UK exports its engineering and advisory expertise all round the world.

Connectivity: The UK (and London in particular) has unparalleled global fibre connections both in terms of size and reach. London's intercontinental fibre reach covers global to local requirements and its major internet exchanges provide unparalleled access between multiple continents and Europe. Although other markets are catching up, it is still difficult to find another city with anything like its market reach in terms of commercial speed and bandwidth. London accommodates financial, enterprise and cloud market services at global scale in one location.

Investment security: The UK has always been regarded as politically stable, with transparent regulation, robust compliance and regulatory controls and standards and a highly respected legal system. The UK's safe structured environment, ownership rights, ease-of-doing-business and ROI (return on investment) potentials attract FDI (foreign direct investment). London has been described as the "ultimate place to de-risk", which is important considering that data centres are among the most expensive real estate investment developments in the world.

⁶ Source: Vicky Pryce, Board Member, Centre for Economics and Business Research, July 2016

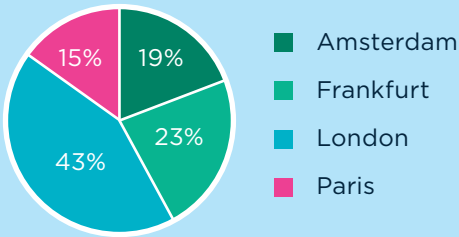
⁷ See "Ours goes up to 11": <https://www.techuk.org/insights/news/item/8583-ours-goes-up-to-11>

Box 1: UK Data Centres: Fast Facts

- There are around 500 data centres in the UK, excluding facilities under about 100m², server rooms and distributed computing.
- Around 1/3 of these are commercial (colocation) facilities.
- The commercial sector, while it only represents a fraction of UK facilities, is an important barometer of the wider industry.
- The UK data centre sector is globally important, London alone is ranked second in the world.
- London dominates the European market with 43% of the Tier 1 supply ⁸

Top 6 Global data centre markets (source CBRE)		
1	Northern Virginia	421 MW
2	London	354 MW
3	Phoenix	228 MW
4	Frankfurt	184 MW
5	Amsterdam	164 MW
6	Tokyo	146 MW

European Colocation Supply: Major Markets (Source: CBRE)



- 70% of the UK colocation market is clustered within or around the M25. Manchester is the second regional hub outside London. There are major facilities in cities like Cardiff and Newcastle.
- Just under 130 facilities participate in the Climate Change Agreement for Data Centres, a sector specific agreement with government to improve efficiency in exchange for concessions on, or exemption from some energy taxes. These sites consumed 2.15TWh of power in 2015, about 95% of power used by commercial colocation providers in the UK.
- Just the build and fit for London represents over £2bn of investment.

Analyst comments, 2016

451 Group: July 2016

- London: MTDC (Multi Tenant Data Centres) total supply operational square feet 3,947,400
- 127 facilities within and around M25. Total MW 484
- Utilisation 77%

DCD, July 2016, on demand for data centre services

Finance is not the only corporate sector in London - over 70% of the FTSE 100 are located within London's metropolitan area, and 75% of Fortune 500 companies have offices in London.... One in every five of Europe's largest 500 companies are headquartered in central London. 40% of racks in the UK, 35% of space and 45% of power consumption are located within the M25, and within 50k of the M25 on the arterial motorways that emanate from London. Real Estate costs, regulations and concerns about power availability closer to the centre of London have created growth in pockets throughout South East England acting as the data hinterland for the City of London, as New Jersey does to Manhattan.

⁸ CBRE, European Data Centres Marketview, Q2 2016:
<http://www.cbre.com/research-and-reports?PUBID=85431e93-d6ae-41f1-b3af-783f2d2bb68f>

5 Market response to Brexit

The UK data centre market, itself both enabling and enabled by disruptive technology, has always been subject to rapid change, driven by R&D, by corporate or consumer behaviour, by economics and by regulation and policy. So the sector is relatively agile and adaptable. It also benefits from its sheer size and market diversity.

Analysts at 451 Research⁹ see Brexit as the most significant of five disruptive trends that are currently affecting the UK market. The other four are: consolidation through merger and acquisition; major changes in the data protection regulatory landscape; the growth in cloud and infrastructure-as-a service – IAAS (together with associated changes in business models, especially those where providers no longer need to own or operate the infrastructure) and the increasing importance of partnerships, co-opetition and business ecosystems.

So, rather than classifying Brexit as an extinction level event, or a catastrophe for our businesses, analysts agree that data centres are not dinosaurs and that Brexit presents both risks and opportunities.

This is borne out by feedback from the sector, which is very mixed. Some operators predict little change, some are already feeling adverse effects, some say it is too early to tell and others are busy developing strategies for a range of different outcomes. What is generally agreed is that the real impacts of Brexit will not manifest themselves immediately, but will be seen in a couple of years' time: projects to build or expand UK facilities take several years to deliver, so it will be a while before the effects of those that have been delayed or offshored materialise in market reports and statistics:

"Our initial conversations with providers have shown that most providers intend to go ahead with build plans. There is already capital committed ... and pipelines to fill. If we do come back and make a shift in our predictions following Brexit it would be most likely to be seen around that 2018 mark, or maybe 2017 if it affects new providers entering the market. In general we are predicting healthy figures for growth over the year ahead".
Penny Jones, Senior Analyst, 451 Research

The litmus test for the effects of Brexit will be London and in particular the key London financial sector which remains one of the focal point of the UK data centre industry.
DCD Intelligence, 2016

There have already been some indications from investors and operators eschewing the UK but these do not (yet) constitute a trend, so our real task is dealing with a temporary period of uncertainty. Brexit need not lead to significant attrition of the UK's data centre market, provided that adequate steps are taken.

In the meantime, the UK is enjoying record take up of data centre space: CBRE's European Data Centre Marketview for Q2 2016 reported a record half year¹⁰. Market analyst Mitul Patel observed

"the FLAP markets of Frankfurt, London, Amsterdam and Paris combined to produce 35.5MW of take-up in Q2 2016. This represents the highest quarterly take-up on record for the four markets collectively and means that over 55MW of IT power has been transacted in the first half of 2016 alone. Q2 2016 saw strong performances from London, Frankfurt and Paris. London recorded the highest individual quarter of any single-market on record..."

Operators must prepare themselves adequately and policy makers must act quickly to ensure that the UK continues to be an attractive place to invest, locate and grow.

⁹ See 451 Group's helpful Brexit Webinar: What the Brexit means for the London Multitenant data centre and hosting markets, July 11 2016: <https://451research.com/webinars>

¹⁰ CBRE European Data Centre MarketView 2016 Q2: <http://www.cbre.com/research-and-reports?PUBID=85431e93-d6ae-41f1-b3af-783f2d2bb68f>

6 Threats and opportunities

This section explores opportunities and threats for data centres in more detail. We take the Brexit Dashboard from the executive summary as our starting point and look at each policy area in more detail.

THREAT	UNCERTAINTY	DATA FLOWS / DATA PROTECTION	TRADE	SKILLS	ENERGY and COMMODITY COSTS	INWARD INVESTMENT	ENVIRONMENT & CLIMATE CHANGE	OPPORTUNITY
What is the risk?	Paralysis, planning blight. Loss of FDI. Offshoring, relocation, attrition	UK deemed inadequate as data host. Restrictions on data flows to EU. Offshoring, relocation, attrition	Exclusion from trade agreements. Tariffs on physical goods. Non-tariff barriers on services.	Acute skills shortage, especially technical skills. Operational and business risk. Constraint on expansion.	Increased operating costs. Failure to compete.	Loss of FDI. UK competitiveness damaged. Relocation.	Competitive disadvantage. Burdens without benefits	What is the risk?
How do we mitigate this risk?	Immediate high level commitment to protect data flows and trade in services.	Adequacy. Legal clarity.	Single market access	Free movement of skills. Review Tier 1 & Tier 2 criteria. Protect non UK employees.	Protection from high energy costs and non-commodity energy costs	Explicit support for sector. Bespoke incentives. Practical help for FDI's	Equivalent standards and targets but greater freedom in how they are achieved.	How do we mitigate this risk?
Can we turn this into an opportunity?		Parity = success. Simplified GDPR possible in theory but unlikely in practice.	Parity = success. Limited scope for additional third party trade agreements.	Opportunity to rethink migration rules and access a wider pool of international talent.	Better support for priority sectors freed from constraints of State Aid Rules.	Scope to radically upgrade the UK's offering. Incentives can be targeted where they will be most effective.	Unprecedented opportunity to review and streamline a burdensome array of policy measures	Can we turn this into an opportunity?

The dashboard spectrum indicates how we interpret the respective levels of threat and opportunity presented to the sector in each of seven policy areas. By policy areas we mean issues that government can influence. We have included uncertainty in this collection: although this is not strictly speaking a policy issue in the same way that skills or trade is, nevertheless it is a very important factor and one where we seek very urgent government action.

At the red end of the scale, issues like uncertainty and data flows present threat and, so far, little opportunity. On these issues we consider that parity with existing conditions would be a successful outcome. In areas like data protection and trade there might be scope for opportunity in theory, but this may be very tricky to realise in practice. Moving across the spectrum we see more opportunity for the sector. In most areas shaded yellow or green we see two levels of opportunity:

Firstly we see Brexit as a catalyst – a catalyst to review, reconsider, renegotiate, revise, repurpose. We have an opportunity to reset our global competitive position and to rethink our priorities and partnerships. We need to be bold and we need to be proactive. We need to have a plan.

Secondly Brexit offers the potential for some degree of freedom from existing regulatory or pricing constraints. There are areas where EU based requirements are adding unnecessary burdens, making the UK uncompetitive or hampering growth. While it is essential that we maintain and uphold the same standards as the rest of the EU in areas like data protection, energy efficiency and emissions, there is plenty of scope for improvement in the way that policy measures are designed, implemented and enforced. We can also peel off some of the gold plating that so often makes UK compliance unnecessarily cumbersome and costly and places us at a disadvantage compared to the rest of the EU.

We will now look at each policy area in turn.

6.1 Uncertainty

At time of writing, the biggest challenge facing the sector is uncertainty: uncertainty regarding the future legality of international data flows, uncertainty regarding future access to the Single Market, and uncertainty regarding the free movement of skills.

Until this is resolved the UK data centre sector is vulnerable to the loss of foreign direct investment (FDI) and could miss out on the short term expansion plans of domestic and multinational operators. Some existing business is at risk of being relocated. The UK is also temporarily unattractive to highly skilled non-British EU nationals seeking employment in the sector.

Risk: Paralysis, planning blight, loss of FDI, loss of contracts, loss of skills, offshoring, relocation

Opportunity: Not yet identified

ACTION: Immediate commitment that data flows, single market access and skills will be prioritised in negotiations. An immediate undertaking to minimise uncertainty.

"Despite 2015's gentle return to economic growth in the UK, uncertainty about the outcome of the Brexit referendum saw a slowdown in multi-tenant datacenter and hosting and cloud industry investment in H1 2016. This has been compounded by the vote to leave the UK, creating volatility that is likely to affect investment decisions in the short to medium term"
(451 Research) ¹¹

Uncertainty in the run-up to the referendum had already hampered investment in some areas and we are aware of a number of new business contracts that were put on hold temporarily or directed elsewhere. Now that we are due to exit the EU, technology lawyers are temporarily advising their clients against a UK location for operations dependent on cross border data flows into the rest of the EU until we have greater clarity. Operators and inward investment advisors are reporting that some high value contracts are being redirected to Dublin, Frankfurt or Amsterdam in preference to the UK and that in some cases these decisions are directly attributable to Brexit.

A leading edge SME colocation provider reported:

"We had five big deals on the table. Two have been put on hold indefinitely and one is now going to Dublin. We are working very, very hard to retain our remaining two". Market analysts and those engaged with potential inward investors have made similar observations: "International hosting firms have historically used London as their European base, expanding their presence via established networks of carrier-neutral hotels into the larger economies of Western Europe. The Brexit vote creates potential uncertainty around this strategy - potentially prompting some providers to consider other locations"
451 Research, 2016, ibid

New business will not be the only casualty; a prolonged period of uncertainty exposes existing activity to attrition: multinationals that use the UK as an entry point to Europe may leave.

"In a 'worst case' scenario where Brexit causes inward investment to dry up and for UK data centers to cater only for local and non-EU requirements, the UK footprint would drop to 70.9% of its end-2015 level"
DCD Intelligence, July 2016

In some cases brokers have reported requests for relocation of existing functions and market analysts consider that there is a risk to some of the core trading and connectivity platforms. Losing one of the market matching engines or a key financial exchange would have a disproportionately large impact on the market. If those start to move then the UK market loses critical mass to its competitors and once that happens it will be exceptionally difficult to regain that lost ground. This means that the UK's dominant position as Europe's technology hub could be threatened.

Key requirements

We urgently need a high level government statement confirming that mutual arrangements regarding data flows will be protected or replicated, that we will still have access to technical skills and that digital policy issues will be a priority in negotiations.

¹¹ London Multi-Tenant Datacenter and Hosting Market Report, June 2016

6.2 Data flows & data protection

Our digital economy depends upon the ability to move data across national borders. As providers of the infrastructure that underpins digital transactions, processing and storage, data centres depend on the mutual arrangements that guarantee our standards of data governance, that enable data flows and give our businesses and their customers access to the world's largest market.

"Data is a vital enabler of both the wider European economy and the delivery of public and private sector goods and services. Sectors including finance, retail, transport, agriculture, sport, media and healthcare increasingly depend on effective use of data..... Half of all global trade in services already depends on cross-border data flows. In the modern economy data and trade flows go hand in hand..."

techUK, 2016, Free Flow of Data Position Paper

The future of these arrangements is now uncertain. Many will have to be renegotiated. Two provisions in particular will need to be retained in some form: the first is UK access to the EU-US Privacy Shield, which allows for the free movement of data between the EU and the US. The second is the forthcoming General Data Protection Regulation (GDPR), which will harmonise data protection regimes across Europe and will include a number of new regulatory requirements.

In truth, the industry has been preparing for several years for major changes in the EU data protection regime. These changes are primarily in the form of GDPR which will come into force in mid-2018. This is very likely to be before the UK leaves the EU. So the UK will need to prepare for and comply with GDPR because this will be a legal obligation for all EU member states.

But we must also look ahead and plan for the future. GDPR has extra-territorial effect, so any organisation processing the data of, or offering services to, EU citizens must comply with GDPR, irrespective of where they are located. Moreover, the definition of personal data is expanding in scope. 66% of tech companies have EU customers or suppliers, so it will make sense to continue to apply GDPR in the longer term. The UK will therefore need to update its domestic requirements to match GDPR before we leave the EU.

"If the UK does not reform its law by the time it leaves the EU and retains the Data Protection Act 1998, it will likely be deemed as a destination providing inadequate protection for personal data. This means that the UK would not be able to receive / import personal data from the EU..."

Janine Regan, Associate, CharlesRussellSpeechlys

The consequence would be that UK companies receiving personal data from the EU would have to enter the Commission's approved Standard Contractual Clauses (SCCs) to make the data transfer legal. In reality it is likely that our data protection laws will be reviewed and reformed in the near future. The UK's new Information Commissioner made this clear in her maiden speech on 29th September:

*"The fact is, no matter what the future legal relationship between the UK and Europe, personal information will need to flow. It is fundamental to the digital economy. In a global economy we need consistency of law and standards - the GDPR is a strong law, and once we are out of Europe, we will still need to be deemed adequate or essentially equivalent. For those of you who are not lawyers out there, this means there would be a legal basis for data to flow between Europe and the UK."*¹²

Careful consideration needs to be given to ensure that the UK's data protection and national security¹³ laws are complementary. A legally robust adequacy decision is critical to guaranteeing uninterrupted data flows during the UK's transition out of the EU.

The impact of failing to achieve adequacy with European data rules cannot be overstated. An undertaking that

Risk: Restrictions on data flows. UK no longer adequate as a platform for data services into EU. EU data hosted in UK deemed inadequately protected. Offshoring, relocation, attrition.

Opportunity: In theory, simplified GDPR standards without the bells and whistles that are presenting compliance problems for operators. In practice this outcome is unlikely.

ACTION: Adequacy. An undertaking that UK data governance laws will continue to be adequate for compliance with EU and global requirements.

¹² <https://ico.org.uk/about-the-ico/news-and-events/news-and-blogs/2016/09/transparency-trust-and-progressive-data-protection/>

¹³ For more information on National Security including Investigatory Powers see www.techuk.org/investigatory-powers

the UK's regime will continue to be deemed adequate is therefore urgently needed. In the meantime, some of our members are reporting worrying impacts; customers are seeking undertakings regarding future data flows, some business is being put on hold and there is the threat that new business will be redirected:

"As a global operator, we see significant demand for our data centres coming from geographies outside Europe, particularly the US. When customers are choosing where to site their platforms, they are making a significant investment and their planning horizon is often 10+ years. The UK has historically been seen as an attractive location for such platforms, although other European locations, notably The Netherlands, Germany and Eire are increasingly competitive.Restrictions on movement of data will tip the balance in favour of these alternative markets at the expense of the UK."

MD, global data centre operator

In fact, other locations are actively promoting themselves as alternative solutions to the UK where data flows will be unaffected by Brexit.

*"Ireland is a politically stable, democratic, EU member state with a highly educated workforce. As a result of excellent innovation conditions and sustained foreign direct investment, Ireland has retained and attracted a large pool of ICT talent for organisations that work in the tech sector. In addition, following the result of the recent referendum in the UK, Ireland will shortly become the EU's only country with a native English speaking workforce"*¹⁴

Key requirements

The UK must continue to be deemed adequate in terms of its data protection regime and meet the standards required by EU regulators regarding the protection, management and stewardship of data. So we must ensure that the UK has a regulatory regime that complements, supports and protects an adequacy decision. This will ensure that the data of EU citizens can flow between the UK and the rest of the EU and be held and processed here. Adequacy is absolutely critical for our members and their customers.

In theory, there may be scope to make minor changes to some aspects of GDPR in the longer term but we need to be aware that anything that we do to its core provisions may increase the risk of undermining the adequacy decision regarding the UK. In terms of priority, adequacy is paramount.

Having said that, we do have the opportunity to build a positive data regime around GDPR that creates a permissive and innovative regulatory environment for the UK. We have an excellent track record in setting the standard for data protection within Europe and can continue to do so. Work needs to start now in full partnership with industry to develop solutions that position the UK as a global data leader.

¹⁴ <https://www.servecentric.com/news-blog/5-reasons-why-ireland-perfect-home-your-it-infrastructure>

6.3 Trade

Access to the Single Market allows us to compete for business on equal terms across Europe, free of tariff and non-tariff barriers. This generates jobs and growth and is a key factor in the UK's ability to attract foreign investment. Brexit means that the UK will also lose privileged access to other markets with which the EU negotiated agreements (36 trade agreements with 53 countries). While membership of the WTO (World Trade Organisation) is the default option, alternative models for the UK are being considered. Most models, including EEA (the Norway model) and EFTA (the Swiss model) require the free movement of people as a fundamental pre-requisite. A bespoke arrangement for the UK therefore looks more likely.

Trade barriers like tariffs predominantly affect physical goods. They add costs for operators importing or exporting plant or hardware.

"Changes to the trading arrangements between the UK and the EU will obviously change the import and export of data center and IT equipment, and also the trade in services. The devaluation of sterling over a sustained period will also have impact – the pricing of some IT equipment imported into the UK has already begun to rise."
DCD Intelligence, July 2016 ¹⁵

However, trade barriers also pose an indirect threat: data centres provide the core IT infrastructure for all economic sectors, whether manufacturing or service based. So a negative impact on one sector will affect our operators because anything that affects our customers will affect demand for our services. So a negative impact on retail, for instance, will inevitably be felt by data centres.

Non-tariff barriers include regulations, procurement rules, import quotas, licences, restrictions on particular source materials or manufacturing methods and a whole range of other requirements. They might be designed to protect domestic industry, to protect the environment or to protect consumers. Non-tariff barriers, especially regulations, have a significant impact on services, for instance by restricting data flows. The Institute of Fiscal Studies observes that:

"Service trade does not tend to be affected by tariffs or customs checks – so non-tariff barriers are especially important. Like many developed economies, the UK's economy is predominantly service-sector based. However, the UK is unusual in that services play a significant role in trade – they have grown significantly in the last 15 years and we export considerably more than we import, creating a service 'trade surplus' equivalent to some 5% of national income. The Single Market has focused increasingly on smoothing trade in services in the last two decades. For UK service exports, the EU is by far the largest market accounting for almost 40%, whereas emerging economies such as Brazil, Russia, India and China together account for less than 5%." ¹⁶

Key requirements

Untangling the impacts on trade and removing tariff and non-tariff barriers for UK businesses with multiple trading partners will be exceptionally complex. The process of renegotiating trade agreements an outsider to the world's largest market will be time consuming and problematic. techUK has commissioned further work in this area.

Risk: Exclusion from trade agreements. Tariffs on physical goods. Non-tariff barriers on services. Competitive disadvantage for UK firms.

Opportunity: Very limited. Some scope for third party trade agreements.

ACTION: An undertaking that access to the single market will be the priority in negotiations so that UK operators and their global customers can continue to sell digital services to the EU.

¹⁵ Brexit: What will be the new normal, DCD Intelligence, July 2016

¹⁶ Institute of Fiscal Studies <https://www.ifs.org.uk/publications/8411>

6.4 Skills

The issue of skills presents us with both threat and opportunity and as a result this section is rather a long one. Realising these opportunities depends on the correct policy actions being implemented. The obvious corollary is that if the right approaches are not adopted with regard to attracting and retaining essential technical skills then Brexit poses a significant threat to data centre businesses in the UK.

The UK data centre sector cannot fill its current skills gap with domestic talent. The success of the UK data centre sector is underpinned by its ability to attract the best skills from across Europe. Many non-British EU nationals work in key roles within data centres, both technical and non-technical. Clarity is urgently required on the status of these individuals, how they will be protected and how we can continue to make use of their essential and specialist skills.

The obligation to accept the free movement of people within Europe has forced the UK government to place very tight constraints on immigration from further afield. Whilst we have got no closer to meeting our immigration targets, the result has been a dramatic tightening of the Tier 1 and Tier 2 requirements¹⁷. What this means in effect is that we are placing severe restrictions on skilled migration in order to limit overall immigration.

The Migration Advisory Committee's recent Review of Tier 2 migration¹⁸ recommended that Government should commission a study on skills shortages in the IT industry and made some very pertinent observations – that policies to limit migration may lead to unintended consequences such as offshoring or relocating business operations¹⁹, and that changing the requirements on skilled migrants from outside the EU would have little impact on overall numbers²⁰. British Future's 2014 report "How to Talk About Immigration" also neatly captured the migration conundrum facing policy makers:

*"In the real world, reducing the numbers involves a paradox. The only clear way to address public anxiety about immigration levels is by cutting the forms of immigration about which people are not anxious."*²¹

At the moment we have a two-fold problem within the data centre sector and across the tech sector at large. We must meet our future skills needs by developing the right domestic skills, but we also have an existing skills shortage. Regarding the longer term, a number of initiatives are now in place to address our future skills pipeline. However, these do not address the sector's immediate needs.

Future skills needs

Government is clearly committed to improving the level of STEM (science, technology, engineering and maths) skills and matching the skills that emerge from further education with those actually needed by industry. In addition to engaging with government initiatives, the data centre sector is working on other fronts to help close our future skills gap. Projects include the development of apprenticeship standards, engagement with primary, secondary and tertiary education, work to improve the level of professional registration and raising awareness

Risk: Acute skills shortage, especially technical. Operational and business risk. Constraint on expansion.

Opportunity: Opportunity to rewrite our migration rules, make better use of existing visas, simplify and streamline skilled migration and access a wider pool of international talent.

ACTION: An undertaking that the UK will be open to free flow of skills and that non British EU employees, on whom we depend for technical and other essential roles, will be protected.

¹⁷ Tier 1 of the Points Based System enables skilled individuals from outside the European Economic Area (EEA) to seek work in the UK. That route is now severely restricted. Tier 2 is the primary route for economic migration to the UK. Broadly, the Tier 2 route is for skilled workers from outside the EEA who have an offer of employment in the UK in an occupation classed as skilled to NQF6 or above. They are subject to minimum salaries to prioritise uptake of domestic skills. The Tier 2 General route applies to two categories of skilled workers: those coming to fill jobs that have been advertised under the Resident Labour Market Test (RLMT), and those coming to take up jobs on the Government's Shortage Occupation List (SOL). Sponsoring companies must pay an annual charge (skills levy)". Summarised from Migration Advisory Committee Review of Tier 2 and other sources.

¹⁸ <https://www.gov.uk/government/publications/migration-advisory-committee-mac-review-tier-2-migration>

¹⁹ "There are a number of risks involved in pursuing a policy objective to reduce immigration..... some employers may choose to move their operations overseas if there are quantity or price restrictions placed on the migrants they might otherwise wish to hire"... ibid, point 1.6

²⁰ "In the context of the Government's objective to reduce overall net migration, reductions in non-EU work migration can only make a marginal contribution. If non-EU net migration was zero, overall net migration would still exceed a quarter of a million" ibid, point 1.4, page 1

²¹ <http://www.britishfuture.org/wp-content/uploads/2014/11/How-To-Talk-About-Immigration-FINAL.pdf> and exec summary: <http://www.britishfuture.org/wp-content/uploads/2014/11/How-to-Talk-About-Immigration-briefly.pdf>

of the attractiveness of the sector as a career choice. The IET's latest survey of engineering skills reports that 68% of employers are concerned that the education system still struggles to keep up with the skills required for technological change and that 62% are concerned about graduate skills ²².

However, the long term strategy to produce sufficient domestic talent is very much 'long term' (many years out) from where we currently are, and is a non-trivial task. So a viable medium term strategy is critical if we are to avoid losing business to locations elsewhere that are able to provide access to the necessary talent.

"I am involved in putting together some of the Trailblazers apprenticeships for Digital Industries and I can see that it isn't going to be a quick fix, even once the schemes are finally in place.... There are simply not enough kids currently coming through the upper school system to fill the forecasted skills gap in our sector, and even those that are in the IT pipeline are being encouraged to go into the application side (web design, digital marketing etc) rather than the business end that makes everything work"

Gary Thornton, British Computer Society, Data Centre Specialist Group, 2016.

It is acknowledged across the industry that 80% of the engineers currently working in the sector will be retired in 20 years' time. So one important element of our skills strategy will be to find some means of retaining their invaluable "tribal" knowledge so that it does not have to be relearned from scratch.

Immediate skills needs

As mentioned above, initiatives focused on the future do not address our immediate skills needs. Technical skills for data centres are in very short supply and operators have to seek far and wide to fill key operational and technical roles. This is evidenced by further reference to IET's 2016 skills survey, which reports that 52% of employers are currently recruiting for new engineering and technology staff and that 57% are currently or have recently experienced problems recruiting senior engineers. Only 5% of employers feel that Brexit will impact their recruitment positively (*Ibid*). Peter Hannaford, Chairman of Datacenter People, the leading recruitment firm serving the data centre sector worldwide, commented:

"The requirement for pure mechanical and electrical engineering skills is reducing, replaced by the need for a new breed of data centre "technician" that embraces MEP, IT and connectivity skills. The data centre is now the home of the cloud and simply relying on power and cooling expertise is not enough. And given that, according to data centre training firm DCPro, the average data centre engineer is 55-years-old and male, there is going to be a serious shortage of qualified technicians. It's difficult enough to find the right candidates today, even though we're fishing in the big EU pool for talent. After Brexit in view of the restriction on free movement of labour we're going to be fishing in smaller, separate pools which will make our task even more difficult".

Data from colocation providers suggests that at least one in five employees is a non-UK national, spread across roles such as connectivity, construction acquisition, engineering, facility management, operations and construction design. Some observers place the proportion of foreign nationals much higher. This is part of a wider skills shortage across the technology sector that employers currently meet by recruiting from overseas. The following comment by Alice Leguay in the Independent, is typical:

"Many European graduates see the UK as an ideal location to kick off their careers: flexible career paths, a vibrant technological and entrepreneurial sector as well as fiscal incentives, ... Equally, UK employers are keen to bring in highly skilled graduates as they struggle to find appropriately qualified staff in the UK due to a decline in science and maths education over the last 10 years," ²³

Technical staff in operational roles within the data centre environment (as opposed to corporate and management staff in head offices) tend to be young and single and many come from Eastern Europe to work in the UK data centre market, attracted by the diversity of the industry which creates an unparalleled wealth of opportunities, and the English language factor. These individuals generally do not fit the Tier 2 model. This is in line with comments from the Migration Advisory Committee:

"The relative strength of both the UK economy and labour market underpins the current trend of increasing net migration. However, in recent years, the broad increases in skilled employment have been driven predominantly by those born in the EU and not those who would have been eligible for Tier 2."

²² Institution of Engineering and Technology, Skills and Demand in Industry 2016 Survey: <http://www.theiet.org/factfiles/education/skills2016-page.cfm>

²³ See <http://www.independent.co.uk/news/business/news/foreign-graduates-migrant-workers-eu-referendum-finance-tech-skills-shortage-a6889151.html>

Moreover, now that Tier 1 criteria have been restricted, such applicants are unlikely to meet either Tier 1 or Tier 2 requirements. Once the UK leaves the EU, and if there is a deal to end the free movement of people, this pipeline of highly skilled and flexible workers on whom the data centre sector in particular, and the tech sector in general depend, will essentially be closed off. It is therefore critical that firstly those with existing employment in the UK are protected and secondly that forthcoming migration rules are adapted to ensure that we can continue to benefit from this pool of talent. We also need to facilitate the movement of engineers and technicians around the EU to support contracts and projects. We therefore support the points made by the Royal Academy of Engineering in its recent report “Engineering a future outside the EU”.

We are very pleased to see the recent inclusion of some digital skills on the Shortage Occupation List and would like to see this category expanded. We have already made separate recommendations regarding the inclusion of skills that will help the UK play a leading role in big data and analytics. However, there is an urgent need to include specialist digital infrastructure skills for the mission critical environments on which our economy depends. Even if these are time limited this would help us bridge a short term skills gap following our exit.²⁴

This situation can, with intelligent policy making, be turned to the UK’s advantage. If the UK is minded not to allow the free movement of people then there is the opportunity to rethink and redesign our immigration policy around the free movement of skills. Several industries depend very heavily on imported labour: agriculture and food production depend on unskilled imported labour, data centres depend on high skilled labour, and the retail sector also employs a substantial proportion of non-UK nationals. Intelligent policy would balance the needs of each sector, the availability of that labour source within the UK, and the value add that those jobs bring to the economy.

A dynamic migration policy that is responsive to the needs of business and prioritises those roles that generate the greatest value-add can contribute to the economy without the risk of political suicide: many who voted for Brexit are against uncontrolled migration within the EU but UK public opinion supports inward migration of technical and medical skills. Quoting British Future again:

*“There is political and public support for more highly skilled migration to fill skills gaps in our industries, but low-skilled immigration flows will be a more contested area during Brexit negotiations. Employers in some sectors of the economy - food production and hospitality, for example - will still need a supply of low-skilled labour, but much of the public would prefer a reduction in their numbers.....ICM’s new post-referendum research for British Future finds yet further nuance when, rather than discussing all migrants together as a group, one asks about people’s attitudes to different categories of migrant to Britain. Only 12% of people, for instance, would like to see a reduction in the numbers of skilled workers coming to Britain; nearly four times as many people (46%) would like to see more of it, with 42% saying that it should stay the same. Among people who voted Leave in the referendum these numbers remain broadly the same: 45% would like to see an increase, just 15% a reduction and 40% say that the numbers should stay as they are”*²⁵

Key requirements

Firstly, the points system and associated visa arrangements for those with technical skills need to be streamlined and adapted so that those with the skills essential for our industry are not locked out of the UK. Secondly the Shortage Occupation List needs to be revised to ensure that it includes the most difficult-to-recruit roles for data centre operators. These steps would help us meet immediate skills shortages whilst we work to address our longer term needs.

²⁴ Understanding, Demystifying and Addressing the UK’s Big Data Skills Gap:

<http://www.techuk.org/insights/reports/item/9469-the-uk-s-big-data-future-mind-the-gap>

²⁵ <http://www.britishfuture.org/wp-content/uploads/2016/09/What-next-after-Brexit.pdf>

Box 2: Hard to source skills: Comments from operators

"Attracting and retaining good quality Data Centre technicians and operational management continues to be quite a challenge with quite long lead times to fill vacancies. Maintaining 'critical systems' around the clock combines the pressures of reliability and resilience with on-call and shift working, so isn't suited to everyone. Add to this the fact that facilities usually operate in industrial areas and need staff to live locally (short response time) it is easy to see why recruitment might be difficult."

"Sourcing high quality Engineers to support Colocation/Facilities operations in the UK has always been difficult. The key skill set areas that we find hardest to fill are Electrical and Mechanical (Facilities) Engineers with knowledge/experience of operating mission critical facilities in an always on environment. Knowledge and experience of operating specific types of plant and equipment associated with data centres (UPS, Backup Generation, Cooling systems, Energy efficiency). We also struggle to find energy managers/engineers and another problematic area to recruit is operations management from junior to senior roles with solid experience in mission critical facilities."

"In the DevOps world, OpenStack is a very new area and finding engineers with: a) a good computer science (or similar degree), and b) a solid breadth of skills across: platform, applications, storage and networking, proves challenging..... Eastern Europe is commonly perceived as having a particular richness in this type of talent. In addition to the lack of skilled Engineering talent to develop OpenStack cloud innovation, the follow through into technical pre-sales is also hampers the pace of commercialising the innovation developed".

"The posts that are hardest to fill are skilled techs (critical environment experienced) and shift manager posts (antisocial hours). Then the recruitment challenge tends to jump a couple of organisational levels to the more senior roles like technical directors..."

"The roles we really struggled to fill in the last year were Design Engineering and Customer Service Engineer"

"The toughest roles we struggle to hire are 3rd Line Network Engineers and Technical Business Development Execs"



6.5 Energy costs

Data centres are energy intensive but data is a highly mobile commodity. The sector is therefore very vulnerable to overseas competition and offshoring. The UK government must assist the industry by levelling the playing field further to ensure that the UK remains an attractive place for operators and their customers to locate and grow their businesses. Cushman and Wakefield recently ranked the UK very poorly on energy costs - 30th out of 37 in terms of the attractiveness of the UK on the basis of electricity price for operators ²⁵. This is a disincentive for investors and as such negatively affects the UK's competitiveness.

Economic or fiscal support for domestic industry is limited by EU State Aid rules but the UK could do more even within the existing restrictions to support key priority sectors by deploying the kind of measures that we see elsewhere within the EU, especially through tax concessions and other means of reducing power prices. Outside the EU and less constrained by State Aid rules, the UK would have greater freedom to develop more bespoke arrangements.

For data centres, the relief provided by the Climate Change Agreement (which mitigates the Climate Change Levy and the Carbon Reduction Commitment for commercial data centre operators) is very welcome. Unfortunately this only represents a fraction of non-commodity energy costs, which comprise an ever larger proportion of electricity prices. (See Fig 6.1). ²⁷

Risk: Energy intensive businesses exposed to higher costs. Competitive disadvantage. Offshoring, Carbon leakage, attrition.

Opportunity Greater freedom to support priority sectors. Compensation for non-commodity energy costs without constraints of State Aid. UK can level the playing field compared to other countries.

ACTION: Find routes to mitigate energy prices for key priority sectors. Facilitate access to compensation for RO/FiTs/CfDs. Review how we identify energy intensive businesses.

Figure 1-2b: Indicative incremental impacts in 2011, 2015 and 2020 on electricity price (£/MWh, 2010 prices) of energy and climate change policies - Sensitivity using market forecasts of EUA prices 14

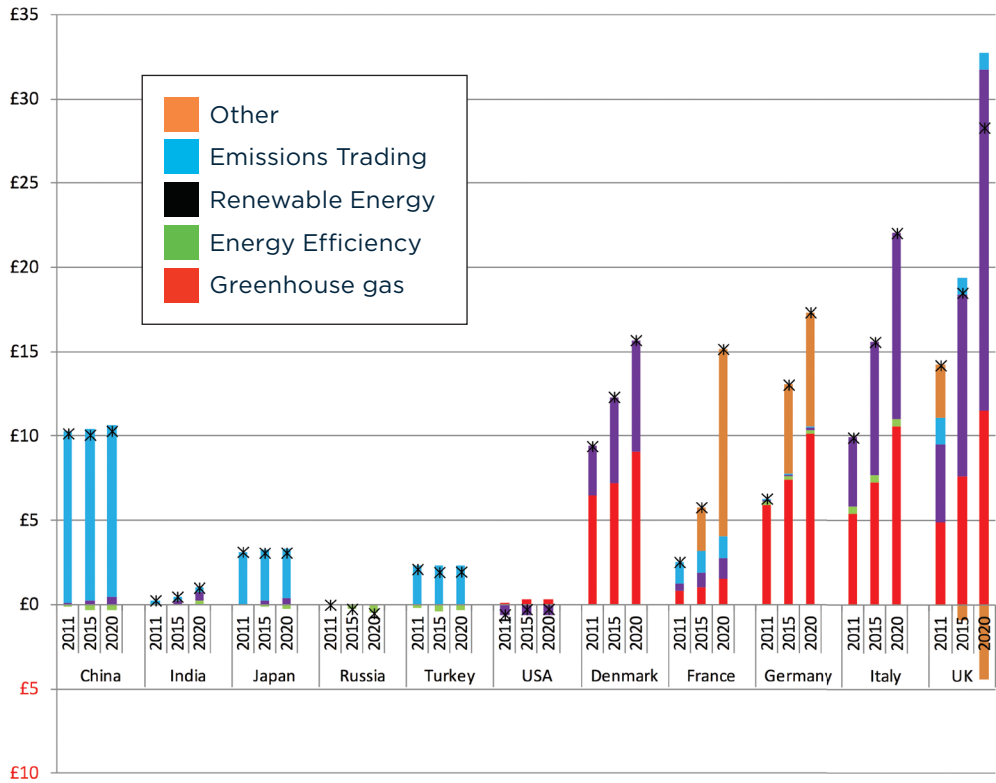


Fig 6.1

²⁶ Cushman and Wakefield Data Centre Risk Index 2016: <http://www.cushmanwakefield.co.uk/en-gb/research-and-insight/2016/data-centre-risk-index-2016/>

²⁷ ICF International 2012, An international comparison of energy and climate change policies impacting energy intensive industries in selected countries. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31768/12-527-international-policies-impacting-energy-intensive-industries.pdf

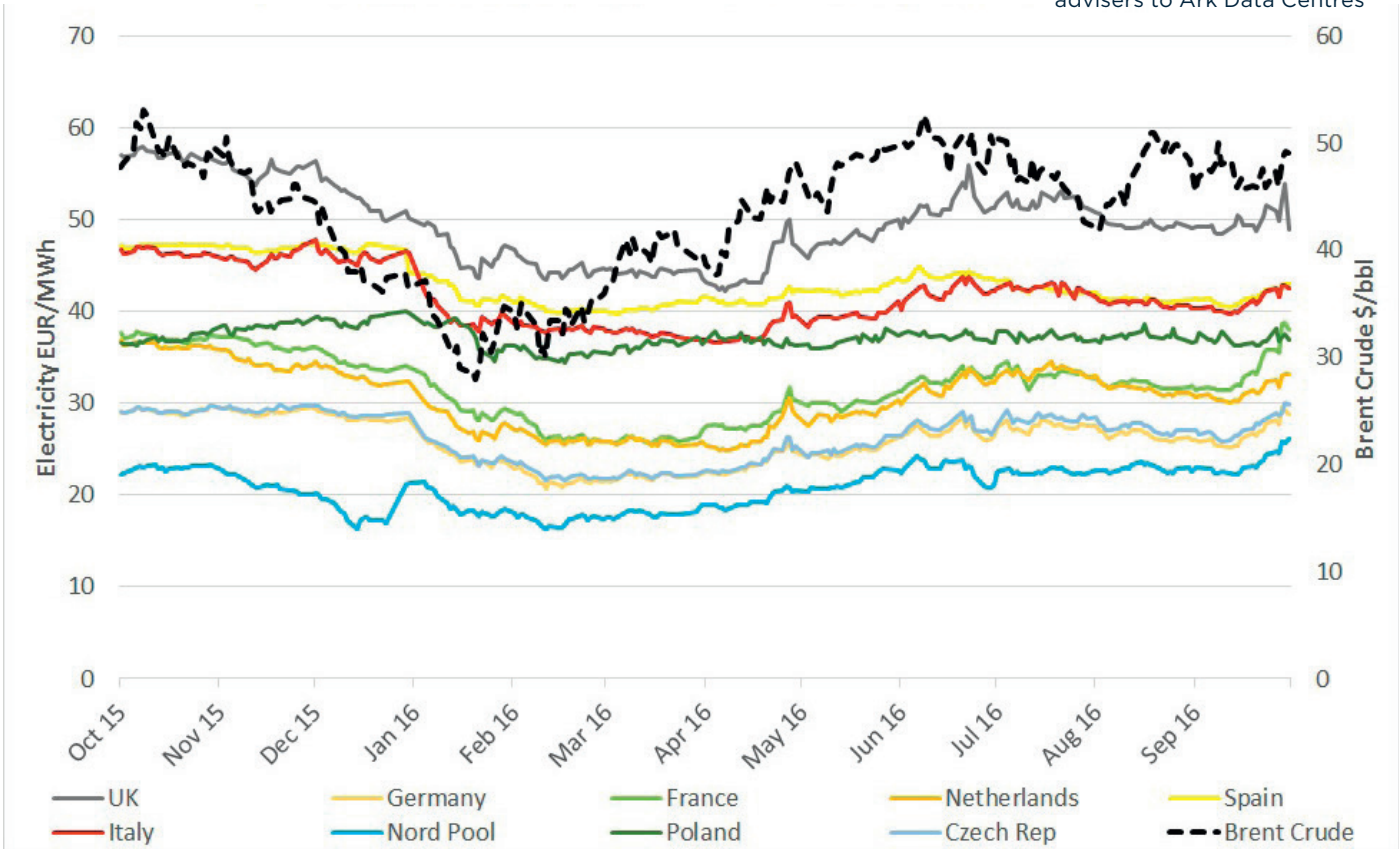
The CCA relief could be augmented by additional rebates or exemptions to compensate for the cost of investment in renewables, which is borne by energy users. This is available for energy intensive industries and the sector has already demonstrated that it meets energy intensity criteria for DECC, but the current approach, which uses different metrics, is cumbersome and could be much improved. The level of compensation could also be increased to bring UK energy costs more in line with those that operators are paying in other European countries.

It is worth having a more detailed look at electricity costs, particularly non-commodity costs, because they present a very real problem for UK data centres. Paul Cranfield, Director of Power for Digital Realty, one of the larger UK data centre operators and a major inward investor, commented:

“Our challenge here is that operations are becoming more and more sensitive to the total cost of delivered power, including wholesale power prices, transmission & distribution costs and levies. We are acutely aware that the way these components are combined in different markets means that taxes and levies can have a profound impact on competitiveness. Our customers are often very agile, with the ability to land/deploy in any of the FLAP [Frankfurt, London Amsterdam, Paris] locations, Dublin or further afield and the cost of power is a significant differentiator”.

European OTC Year Ahead Electricity Baseload vs Brent Crude

Source: Noveus Energy, advisers to Ark Data Centres



This chart shows baseload electricity costs before non commodity costs have been added. Again, the UK does not compare favourably.

It is important to differentiate the data centre sector from other energy intensive foundation industries that government seeks, quite rightly, to support. In many cases compensation or tax relief to mitigate high energy costs helps to prevent UK facilities from being forced to cease production or to prevent catastrophic decline in traditional manufacturing. The data centre sector in the UK is growing, not declining, but it is equally vulnerable because data is the most mobile commodity on earth, and UK operators must be able to compete with their counterparts. Protecting the data centre sector is also very strategic: everyone wants the UK to be a successful digital economy but this cannot happen without the digital infrastructure that underpins it. So protecting the data centre sector is about protecting our future.

Key requirements

We need to find pragmatic ways to reduce the burden of non-commodity energy costs on the sector and deploy other means to help level the playing field on energy costs for operators.

6.6 Inward investment

In terms of its potential to generate jobs, growth and productivity, a range of highly respected institutions concur that investment in digital infrastructure is hard to beat:

*"According to a CSO 2015 report, data-related industries have a larger multiplier effect (1.29) than traditional foreign direct investment companies, and provide a larger economic return than industries such as pharma, chemicals, computer products, medical instruments and media. In a 2015 report, the OECD argues that data and data analytics have become an essential driver of innovation akin to research and development, resulting in greater productivity..... Focusing on the data without the required infrastructure presents a risk of potentially undermining a country's capacity to innovate."*²⁸

Dr Matthew Kennedy, Tyndall National Institute

Risk: Loss of FDI, operations expanded in other locations at expense of UK, UK competitiveness damaged.

Opportunity: Greater freedom in incentives to FDI, scope to upgrade the approach and the offerings.

ACTION: Explicitly value the sector. Provide a bespoke and compelling value proposition. Smooth the runway for FDIs. Emulate competing markets (Netherlands, Germany, Ireland, Norway, etc.).

So investing in digital infrastructure, welcoming inward investment and protecting and nurturing UK operators should be a no brainer. Brexit provides at the very least a catalyst to stand back and consider the UK's attractiveness as a place to invest, to expand activity and to locate new operations. At the same time we need to consider how we can help UK based businesses remain competitive.

For data centres, the UK has always been the primary location of choice in Europe, both for colocation providers and for global data-dependent businesses:

The UK attracts a considerable number of overseas companies that locate their regional head office and its IT infrastructure in the United Kingdom. This is a principle of the hub city that Singapore, Hong Kong, Amsterdam and Dubai have used successfully in attracting a weight of data center investment far greater than their local IT requirement would justify. However, all of these cities represent access to far larger regional markets in the Asia Pacific, the Middle East and the EU, and Brexit may mean the UK is no longer able to count on that benefit.

DCD Intelligence, 2016

It is hard to overstate the full impact of losing data centre business to other countries: it is not the data centre itself, but the fact that it supports functions like head office, R&D and customer clusters whilst providing the business case for improved connectivity in a location or region. Losing potential data centres means losing digital infrastructure.

The sector has also been a major stimulant of regional economic development: Manchester is a case in point with the UK's second largest data centre market servicing a variety of digital industries from content providers like the BBC to local authorities and academia. Data centres will underpin the development of a genuine Northern powerhouse.

However, on the 23rd June the political stability that had been one of the factors encouraging global operators to locate here suffered a direct hit. At time of writing other important pre-requisites for inward investment to the UK are still uncertain. So this is a good point to consider how the UK looks from the outside and identify scope for improvement.

Top considerations for FDI (Foreign Direct Investors) are fibre reach (connectivity), taxation regime, legal system, power (cost and availability) and speed to market. We have already mentioned energy costs and how these might be mitigated to level the playing field a little. There are plenty of other things we can do, including reducing corporate taxes, introductory concessions on local rates, local employment incentives, accelerated or streamlined planning processes and better certainty over planning outcomes.

²⁸ Quoted in the Irish Times, September 30 2016. <http://www.irishtimes.com/opinion/letters/data-centres-and-infrastructure-1.2787246>

UKTI provides a respected bespoke service for data centres but government needs to help by making material improvements in what they can offer. We must now materially upgrade the UK's value proposition.

What are other countries doing?

Elsewhere, governments and regional investment authorities try to reflect these priorities in their attempts to attract data centre operators to invest.

"Unlike other European countries, the UK government has been slow in realising that an inward investment strategy for data centres is crucial to overall economic growth. Countries with a strong political focus on attracting data centres including Finland, Luxembourg, Ireland and Sweden, have witnessed strong demand from large international corporations and overall growth of their digital economies. If the UK wants to increase its digital profile on the international stage, a government sponsored strategy for attracting data centres into the country is needed. This need is further enhanced by the implications of Brexit"

Nicola Hayes, Managing Director, European Data Centre Association

Finland, Sweden, Iceland, Norway, Holland and France have all approved significant incentives to help their inward investment agencies attract new business. Sweden for example has just announced a reduction in energy taxes for data centres from 294SEK / MWh to 5 SEK / MWh from 1st January 2017. Malaysia, Singapore, Luxembourg, Ireland and the Baltic states are aligning government resources to attract FDI. In a number of cases, their overtures to potential investors have been stepped up in the wake of the UK Referendum and industry conferences such as Data Centres Ireland and DataCloud Nordic are advertising sessions focused on post-Brexit opportunities for those markets. Now is a good time for the UK to catch up:

"Given Germany's strong economy and Frankfurt's position as a financial services hub, it is well placed to pick up demand from any organisations needing to move out of the UK following Brexit".

CBRE, European Data Centre Marketview, Q2 2016

Inward investment is not just about tax concessions or energy costs. A company making a £100m investment needs to be confident that the sector is welcome and valued and the process will not be pointlessly prolonged or problematic. All too often obstacles like planning and permitting give developers the impression that they are trying to establish a bridgehead in enemy territory rather than a safely designed and resilient building that will generate jobs and growth.

Key requirements

The UK is clearly considered an attractive place to innovate: 55% of "tech unicorns" (recent start-up companies valued at over \$1Bn) were founded by individuals born outside the UK who have recognised and exploited the opportunities on offer. We must ensure that the UK continues to be the best place to innovate and grow. There is lots to be done but we can start with three actions to make the UK more attractive to data centre investors.

These are:

- 1. Demonstrate commitment to the sector: show that data centres are valued**
- 2. Upgrade the UK value proposition and communicate the factors that make the UK attractive**
- 3. Clear the runway: provide practical assistance to streamline the investment process.**

BOX 3: FOREIGN DIRECT INVESTMENT CHECKLIST

1. Demonstrate commitment to the sector: show that data centres are valued

- Publish a clear Government position: “We value data centres and we want this sector in the UK.”
- Develop evidence to back this up: explain what UK government has done to support the industry.
- Provide a clear and searchable connection to individuals with relevant responsibility within government.
- Clearly identify teams that focus on Data Centre FDI and can help investors.
- Facilitate easy access to data centre statistics and information on the status of the industry in the UK.
- Ensure that the sector is a visible part of government thinking and planning.
- Demonstrate that government understands relevant business models such as outsourced ICT.
- Be inclusive to all prospective investors and look East as well as West.

2. Upgrade the UK value proposition and communicate factors that make the UK attractive

- Emphasise the size of the UK market, the breadth of customers and business offerings and the unique variety of opportunities.
- Reiterate that the UK has a clear and respected legislative regime.
- Demonstrate that the UK has one of the most stable investment environments.
- Provide clear guidance on tax status, both at national level and any tax concessions (such as the CCA) that could be relevant to data centre or cloud operations.
- Consider a reduction in corporation tax.
- Provide clear information on power costs, including both commodity and non-commodity elements.
- Provide clear assurances on security of future power supply.
- Provide clear guidelines on expected speed to market for new projects and identify routes to expedite this process.

3. Clear the runway: provide practical assistance to streamline the investment process

- Showcase and explain how the UK facilitates a safe runway for FDI landing.
- Identify potential sites for ease of site selection.
- Provide planning and/or change of use advice and assistance to help with land purchase and increase speed to market.
- Offer one-stop-shop services including a “meet and greet” for FDIs assessing sites.
- Earmark resources for proactive engagement at international industry events.
- Provide collateral in terms of supporting evidence, case study material and other relevant content that has facilitated previous investment activity.
- Check out the initiatives in other regions that are successfully increasing inward investment and explore scope for applying similar measures in the UK.

6.7 Environment

While the UK will reproduce much EU legislation, there will be opportunities for some instruments to be revised or repealed. The UK should continue to sign up to and comply with EU targets for CO₂ reduction, energy efficiency and pollution control, but there is scope to reduce legislative burdens where these are disproportionate, punitive or deliver no benefit.

The sector is subject to a bewildering array of environmental regulations, compliance requirements, reporting and accounting regimes. For carbon alone we have EU ETS (European Emissions Trading Scheme), CRC (Carbon Reduction Commitment), carbon accounting, and CCL (Climate Change Levy). In terms of energy efficiency we have the CCA (Climate Change Agreement) and ESOS (Energy Savings Opportunities Scheme). Much of the same data has to be collected, collated and reported repeatedly. The multiplicity of regimes, often with different prices for carbon, different reporting routes, dates, processes and requirements, different departmental leads and different regulators, render the current compliance landscape duplicative, burdensome and of Byzantine complexity. In fact, the UK has more climate change legislation than any other country in the world.

While we believe that it is very important to retain existing targets and it is of course essential for trade that we continue to meet all compliance and product standard requirements, policy outcomes could be achieved in a far less cumbersome way. Specifically, ESOS adds little value for intensive energy users but significant expense. EU ETS delivers no benefit when applied to data centres²⁹ who could be exempted as low emitters who pay a disproportionate amount of the associated costs. CRC has long been discredited as an energy efficiency incentive and most major energy users account for CO₂ through voluntary schemes like CDP (Carbon Disclosure Project) without the need for mandatory requirements. In terms of air quality measures, IED (Industrial Emissions Directive) and its UK equivalent (EPR – Environmental Permitting Regulations) could benefit from simplifications to the permitting process for emergency standby plant. On the plus side, the CCA has been successful in driving improvements in energy stewardship and has provided invaluable data on the sector's energy use.

Treasury has recognised this and a major review is planned. Brexit presents us, for the very first time, with a blank canvas and the opportunity to develop a holistic long term framework free from the constraints of existing EU Regulations. We have the opportunity to examine each instrument on its merits and evaluate it in terms of its effectiveness in achieving policy outcomes. Policy makers are rarely if ever on the receiving end of their schemes so business should be involved in this dialogue: it is they who experience the compliance process at first hand. Many are in the unenviable position of being captured by multiple instruments. Our members find the lack of joined up thinking and duplication bewildering and infuriating. Worse, this distracts them from where the real action is needed in doing the right thing for the environment.

As mentioned above this does not mean that we have to abandon or weaken any of our emissions reduction or energy efficiency targets. It does mean that we can create a truly streamlined reporting framework for energy, carbon and other aspects of environmental performance, that we can focus policy where there is the potential for the greatest reward, we can free small emitters or low energy users from the shackles of over-the-top compliance; we can provide incentives and financial support to sectors that matter the most to the UK economy. Meanwhile we can continue to lead on developing and implementing standards that embed low carbon technology into our economy.

Key requirements

Relinquish the Energy Efficiency Directive (ESOS) and EU ETS. Simplify IED/EPR and retain exemptions for standby under MCPD. Delay CCA target negotiations until there is more certainty over the impact of Brexit on occupancy rates.

Risk: Complex and burdensome legislation that puts UK firms at a competitive disadvantage without the mitigations of EU membership.

Opportunity: A blank sheet - unprecedented scope to streamline policy measures without compromising policy outcomes. Greater freedom in the way we meet environmental and efficiency targets.

ACTION: Retain environmental targets and standards but review energy and carbon taxes. Streamline existing approaches and abolish ineffective instruments. Delay target renegotiations for the CCA.

²⁹ See our position on EU ETS: https://www.techuk.org/images/techUK_DCC_Com_1602_EU_ETS.pdf

7 Summary: Priorities for Action

In section 6 we explored the threats and opportunities facing the UK data centre sector as a result of Brexit. We looked at seven policy areas – uncertainty, data flows, trade, skills, energy costs, inward investment and environment. The actions we identified for government in those seven areas are summarised below.

- 1. Uncertainty:** Provide an immediate undertaking that government will protect data flows, implement GDPR equivalent and prioritise single market access. At this stage, making intentions clear before acting is infinitely preferable: Uncertainty is damaging, so telling us what you are going to do and then doing it is much better than doing it and then telling us afterwards.
- 2. Data flows / Data protection:** Provide an urgent undertaking that UK data governance laws will be adequate for compliance with EU and global requirements so that UK operators and their global customers can continue to host, manage, process and transact EU and other national data in the UK. Work must then start on developing a comprehensive international data transfer solution (in and out), an equivalent to GDPR and an outcome on investigatory powers that meets global privacy standards while not affecting legitimate law enforcement and interception.
- 3. Single Market:** Provide an undertaking that access to the single market will be a priority in negotiations so that UK operators and their global customers can continue to export digital services to the EU without trade barriers or non-tariff barriers.
- 4. Skills:** Provide an urgent undertaking that the UK will be open to free flow of skills and that non British EU employees, on whom we depend for technical and other essential roles, will be protected. Redesign existing immigration policy and replace it with a skills based migration policy.
- 5. Energy costs:** Mitigate energy prices by reducing non-commodity energy costs: Facilitate access to compensation for RO/FiTs/CfDs. The UK needs a simpler and more consistent way to identify energy intensive businesses. Current arrangements are complicated, targeted at mitigating industrial decline rather than protecting growth, and are inadequate.
- 6. Inward investment:** Make a stronger case at Government level to support inward investment in the sector. Be explicit that the sector is valued and welcome. Upgrade incentives and target them more effectively. Smooth the runway so that investors are not beset by unnecessary obstacles. The UK can no longer rely on its first mover advantage and must provide a compelling prospectus along the lines of nation state governments in competing markets (Netherlands, Germany, Ireland and Scandinavia).
- 7. Environmental compliance:** Retain environmental targets and standards but review energy and carbon taxes. Streamline existing approaches and abolish instruments that are ineffective or unduly burdensome. Delay target renegotiations for the CCA until there is greater clarity on the impact of Brexit on occupancy rates. Remember that the starting point is a clean sheet.

Although our departure from the EU is not likely to happen until 2019, the sector started to feel the implications as soon as the result of the Referendum on 23rd June was known. This means that policy actions need to be implemented at a speed that is entirely uncharacteristic of the normal policy development process. In evolutionary terms we may not be seeing an extinction level event but we could well be experiencing the equivalent of what is termed “rapid evolution under extreme selection pressure”. As businesses we need to be agile, to be adaptable and evolve to find new commercial niches in this changed environment - and we will be. However, we are not free agents: we operate within a complex set of regulatory and other policy constraints. So we also depend on government to demonstrate similar agility in making policy decisions and in implementing them with real urgency.

8 Contacts and links

Contacts

Data Centres: Emma Fryer, Associate Director
Emma.fryer@techuk.org
Tel: 01609 772 137 / 07595 410 653

Brexit: Charlotte Holloway, Policy Director, Europe and International
Charlotte.holloway@techuk.org
Tel: + 44 (0) 7710 320 795

Tech sector and Brexit

- Post Referendum policy priorities for data centres
http://www.techuk.org/images/Post_referendum_priorities_for_DCsV2.pdf
- techUK's Brexit Five Point Plan
<http://www.techuk.org/insights/news/item/8748-plan-a-use-the-uk-s-tech-excellence-to-power-britain-back-to-growth>
- Brexit: the impact of the UK leaving the EU on UK spectrum policy
<http://www.techuk.org/insights/reports/item/9287-brexit-the-impact-of-the-uk-leaving-the-eu-on-uk-spectrum-policy>
- What Next for Tech Talent in the UK? (available shortly)

More information on data centres

techUK data centre programme
<http://www.techuk.org/focus/programmes/data-centres>
Data Centres Council: The UK Council of Data Centre Operators (techUK Data Centres Council)
<https://www.techuk.org/focus/programmes/data-centres/groups/data-centres-council>

Data Centres for Tiny Tots

- Er, what is a data centre?
<http://www.techuk.org/insights/reports/item/273-er-what-is-a-data-centre>
- Data Centres: Engine of Growth
<http://www.techuk.org/insights/reports/item/278-data-centres-engines-of-growth-combined>
- So What Have Data Centres Ever Done for Us?
<http://www.techuk.org/insights/reports/item/261-so-what-have-data-centres-ever-done-for-us>
- Data Centres: A Day in YOUR Life
<http://www.techuk.org/insights/reports/item/274-data-centres-a-day-in-your-life>
- Data Centres and Power: Fact or Fiction
<http://www.techuk.org/insights/reports/item/275-data-centres-and-power-fact-or-fiction>

Acknowledgements

Mark Acton, CBRE
Derek Allen, Global Switch
Jack Bedell-Pearce, 4D Data Centres
Mark Bailey, CRS
Patrick Coogan, Digital Realty
Paul Cranfield, Digital Realty
Sue Daley, techUK
Tony Day, Schneider-Electric
Julie Gartside, SLR Consulting
Samira Gazzane, techUK
Peter Hannaford, DataCenterPeople
Penny Jones, 451 Research
Lay readers: Carole Fryer, Gaius Petronius, Diane Barningham

Peter Judge, DCD
Adrian Keward, Red Hat
Billy McHallum, Equinix
Shane Murphy, techUK
Mitul Patel, CBRE
Talal Rajab, techUK
Nick Razey, NGD
Dave Smith, DataCentred
Doniya Soni, techUK
Pip Squire, Ark
Gary Thornton, AET4IT
Derek Webster, Schneider-Electric

About tech UK

techUK represents the companies and technologies that are defining today the world that we will live in tomorrow. The tech industry is creating jobs and growth across the UK. In 2015 the internet economy contributed 10% of the UK's GDP. 900 companies are members of techUK. Collectively they employ more than 800,000 people, about half of all tech sector jobs in the UK. These companies range from leading FTSE 100 companies to new innovative start-ups. The majority of our members are small and medium sized businesses. www.techuk.org