

**CUSHMAN &  
WAKEFIELD**

# **DATA CENTRE RISK INDEX**

INFORMING GLOBAL  
LOCATION STRATEGIES  
IN A DIGITAL WORLD  
EXPANDING AT A  
PHENOMENAL PACE

2016



# INTRODUCTION

## INDEX BACKDROP

The index ranks key established and emerging locations by the most appropriate risks affecting data centre operations in today's current climate. It has been designed primarily to support data centre due diligence and senior decision making when considering global investment and deployment activities.

Our latest edition, Data Centre Risk Index 2016, features 37 countries, a detailed scene setter surrounding the digital world and individual country and regional market commentaries.





## WHAT RISK FACTORS ARE INCLUDED AND WHY?

Following a global survey of more than 4,000 clients, carried out in the closing months of 2015, the criteria used in assessment has evolved. The risk factors have been trimmed from 13 to 10 with the survey also revealing that the individual risk criteria are now more evenly considered in terms of importance within the data centre world. This dilution is reflective of occupiers taking decisions across a broader, more equal spread of key decision making inputs with the aim of successfully prioritising risk, proximity to end market and ability to enhance the customer experience.

Despite this, our survey did highlight a growing concern among corporates surrounding political stability, natural disaster risk and energy security which have now surpassed more traditional drivers such as cost and connectivity. Natural disaster and a location's coping capability ranked as the most important risk factors while political stability ranked second this year, collectively accounting for one third of overall decision making and implying a level of emotional sentiment throughout the survey following a number of major incidents over the past few years. Whether these risks outweigh the proximity picture, and corporates begin to realign real estate accordingly, is yet to be seen and is not always the case, with individuals weighing up the risks against the pressure of being able to serve consumers within the markets in which they operate.

## GETTING TO GRIPS WITH THE BASICS - WHAT IS RISK AND WHY SHOULD IT BE CONSIDERED?

Data centre downtime can cost providers millions in lost revenue and compensation. It can also threaten the livelihood of a business by causing irreparable damage to its reputation. The Data Centre Risk Index assesses various macro level risks – physical, economic and social, that could cause a threat to service continuity and uptime.

Although the Data Centre Risk Index clearly demonstrates that some countries provide a better overall environment for data centres than others, underlying commercial considerations remain a key driver, and therefore the need to be in a particular territory may take precedence over the risks highlighted by the Index. As such, by definition, the Data Centre Risk Index allows business decision makers to anticipate the risks and put in place appropriate measures to mitigate and manage threats accordingly.

The Index is a unique tool, bringing together the core risks and weighting them to create a balanced and comprehensive risk assessment methodology. All our information is sourced from reputable and published third party sources.

The Index is designed to assist companies in making strategic investment and operational decisions about where to locate their data, whether it be server rack deployments or the creation of brand new facilities. Each country has its own risk profile which should be reviewed against the commercial opportunity, business requirement and the company's preference for risk aversion.



## THE RISKS AND APPROPRIATE WEIGHTINGS

The Data Centre Risk Index identifies the top risks likely to affect the successful operation of a data centre, and applies an individual weighting to those risks to create a balanced view and ranking of selected countries.

Criteria	Weighting
Energy (Cost per Kwh)	8.97%
International Internet Bandwidth (Mbit/s)	11.54%
Ease of Doing Business (World Bank Ranking)	11.54%
Corporation Tax	6.41%
Political Stability (EIU Instability Index)	12.82%
Sustainability (% Energy from Alternatives)	8.97%
Natural Disaster	15.38%
Energy Security	12.18%
GDP per Capital	5.77%
Water (Availability per Capital)	6.41%





## **A ONE SIZE FITS ALL MODEL?**

If your priorities and approach to risk require a different weighting, the flexibility of the Data Centre Risk Index allows for different weightings to be applied, methodology and considerations. The Index is based on a flexible risk assessment methodology and it can be applied to any country in the world.

## **ASSESSING BOTH THE MACRO AND MICRO**

The Data Centre Risk Index identifies risk at a macro/country level. Countries scoring poorly on the Index might be able to offer the ideal environment for a data centre at a micro/local level and should not be discounted. The Data Centre Advisory team can provide an in-depth country assessment where required. It should also be noted that many risks can be mitigated or managed with the introduction of relevant safeguards. In certain circumstances, the cost of these measures will be outweighed by the commercial need to be in a particular territory.

# DATA CENTRE RISK MAP



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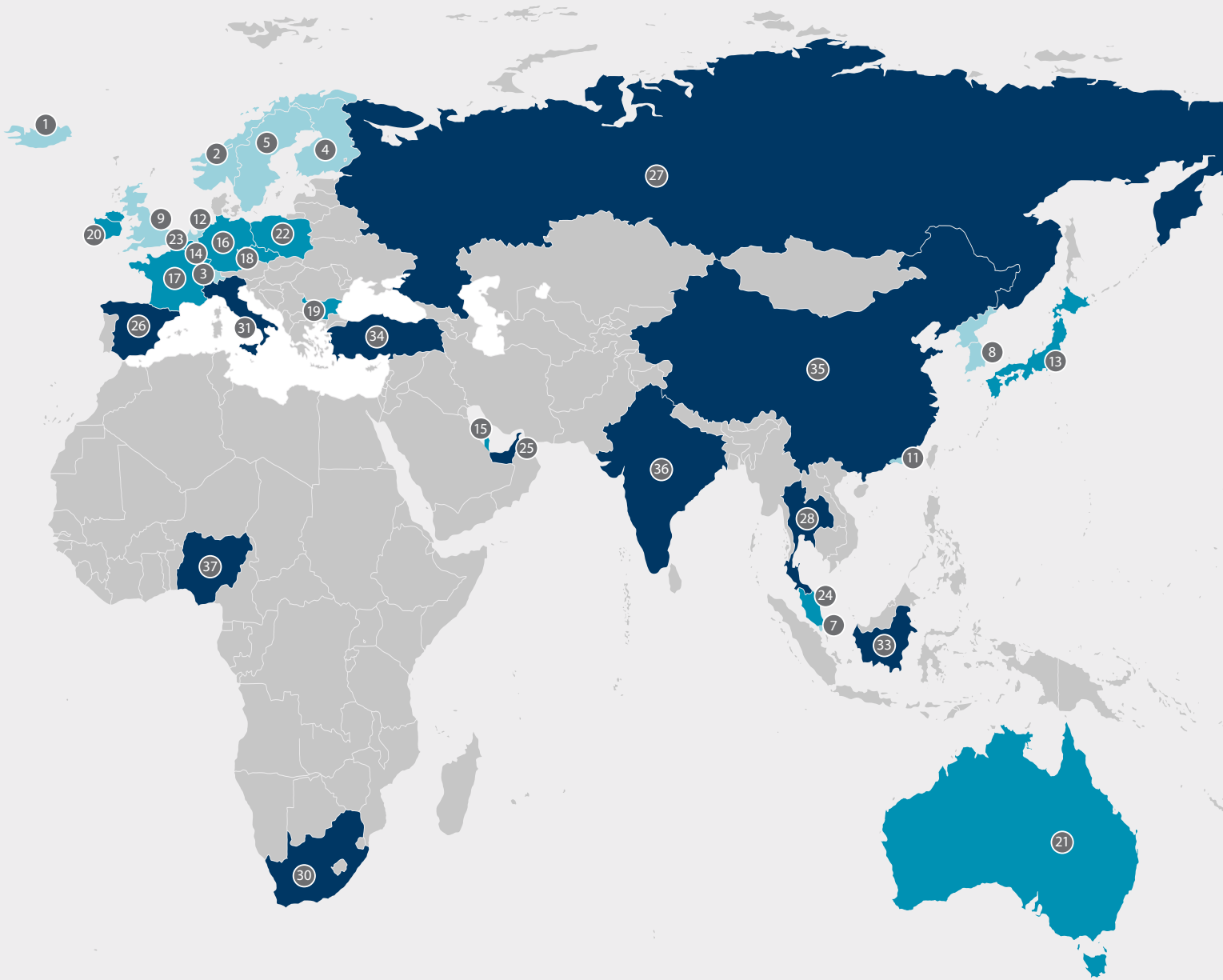
- Low risk
- Medium risk
- High risk

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Rank

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# THE INDEX RANKING BY COUNTRY

2016 RANK	REGION	INDEX SCORE (100= BEST)	COUNTRY	ENERGY - ELECTRICITY (COST PER KWH)	INTERNATIONAL BANDWIDTH (MEGABYTE PER S)	EASE OF DOING BUSINESS	CORPORATION TAX
1	EMEA	100.00	ICELAND	6	10	14	9
2	EMEA	96.21	NORWAY	11	7	7	23
3	EMEA	90.26	SWITZERLAND	8	5	16	6
4	EMEA	90.19	FINLAND	13	8	8	9
5	EMEA	89.92	SWEDEN	22	4	6	14
6	AMERICAS	85.07	CANADA	4	16	10	22
7	APAC	84.50	SINGAPORE	23	11	1	4
8	APAC	83.23	KOREA, REP.	2	1	2	16
9	EMEA	79.81	UNITED KINGDOM	30	14	4	13
10	AMERICAS	78.73	UNITED STATES	3	15	5	36
11	APAC	78.73	HONG KONG	21	2	3	3
12	EMEA	78.06	NETHERLANDS	29	6	18	17
13	APAC	76.48	JAPAN	20	3	21	35
14	EMEA	74.98	LUXEMBOURG	27	22	30	25
15	EMEA	74.73	QATAR	1	29	31	7
16	EMEA	73.75	GERMANY	34	18	11	26
17	EMEA	73.61	FRANCE	24	24	17	31
18	EMEA	73.31	CZECH REPUBLIC	28	9	22	7
19	EMEA	71.53	BULGARIA	14	13	23	1
20	EMEA	71.53	IRELAND	32	17	12	2
21	APAC	68.18	AUSTRALIA	35	25	9	17
22	EMEA	68.12	POLAND	26	19	15	15
23	EMEA	67.93	BELGIUM	31	12	25	33
24	APAC	66.86	MALAYSIA	9	31	13	17
25	EMEA	60.58	UNITED ARAB EMIRATES	19	26	19	37
26	EMEA	59.88	SPAIN	37	20	20	27
27	EMEA	59.68	RUSSIA	5	21	28	9
28	APAC	59.55	THAILAND	15	23	27	4
29	AMERICAS	57.66	MEXICO	10	30	23	27
30	EMEA	53.95	SOUTH AFRICA	25	34	32	24
31	EMEA	53.95	ITALY	36	27	26	30
32	AMERICAS	53.33	BRAZIL	18	32	35	34
33	APAC	51.81	INDONESIA	7	36	34	17
34	EMEA	51.03	TURKEY	33	28	29	9
35	APAC	50.22	CHINA	16	33	33	17
36	APAC	47.84	INDIA	17	36	36	32
37	EMEA	34.75	NIGERIA	12	35	37	27



POLITICAL STABILITY	SHARE OF RENEWABLES IN TOTAL ENERGY SUPPLY (%)	WORLD RISK ASSESSMENT VULNERABILITY AND COPING CAPACITY (NATURAL DISASTER/ ECONOMIC & POLITICAL CHALLENGES IN URBAN AREAS)	ENERGY SECURITY	GDP PER CAPITA	WATER AVAILABILITY
6	1	2	22	13	2
1	2	7	3	5	4
6	10	8	1	6	6
9	7	5	7	19	1
9	5	4	2	11	5
2	11	12	5	15	14
4	33	6	17	3	18
26	34	25	29	22	16
4	30	17	4	17	10
9	24	19	9	8	21
16	35	36	18	7	19
9	28	34	8	10	7
6	29	36	21	20	3
2	31	9	14	2	11
24	37	1	19	1	23
15	16	11	10	12	9
14	20	10	6	18	8
21	22	16	23	24	12
20	21	21	34	30	30
23	23	24	16	9	20
9	26	20	13	14	28
21	19	14	26	26	22
19	27	15	12	16	13
17	25	30	15	25	25
29	36	3	25	4	17
29	13	13	11	23	15
36	32	18	27	27	27
35	9	29	36	31	24
29	18	28	27	29	33
17	15	27	35	34	35
28	12	23	20	21	26
27	3	22	24	32	34
32	4	35	30	35	32
33	16	26	32	28	31
33	14	31	31	33	29
24	6	32	37	36	36
37	8	33	33	37	36

## INDEX KEY TAKEAWAYS

- European countries continue to offer a low risk environment for data centres, securing all top five index positions.
- Top five offer politically stable environments for doing business while offering a low risk location in terms of natural disaster risk and strong fundamentals in terms of energy security and share of renewable resources.
- Market realities are also reflected within the index with Singapore, South Korea and Hong Kong all featuring highly – the latter two evidence that proximity to market, ease of doing business and IT infrastructure can offset the risks of locating within a natural disaster zone while Singapore ranks as the most attractive market for doing business within our index.
- Tax favourable environments result in Ireland and Bulgaria ranking similarly – yet in reality Ireland’s critical mass leads to a much higher level of investment/occupancy with corporate clustering and co-location remaining ever important.

# REGIONAL RANKINGS

## EMEA



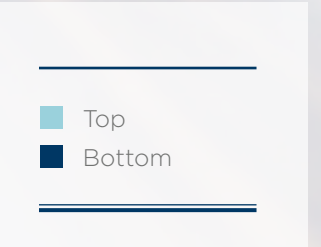
## APAC



## AMERICAS











## MARKET BACKDROP

No matter the business, data continues to grow in its importance. At the same time the sheer volume, accessibility and requirements for its storage and transport, are ballooning. The digital universe is more or less doubling in size every few years, according to the IDC and the need to support and deliver time critical information to end users places huge pressure on the infrastructure, resources and inevitably corporate real estate location decisions.

## **BUT THERE REMAIN A FEW KEY GLOBAL CHALLENGES**

Firstly, in the open market good quality space is being absorbed quickly in core markets and on, what seems in places, an industrial scale, especially by the cloud providers. The emergence of the “edge” data centre with proximity to large domestic markets is a case in point.

Whilst the provision of space is capital intensive, creating a high value asset class, pricing remains competitive and margins historically tight for the providers in a good proportion of the core markets. There is concern that aggressive pricing structures have driven some companies to the brink of failure, whilst the occupier has enjoyed the sun in recent years, the result will only mean increased consolidation, reduced choice and a return to rising occupational costs.

Finally, if hosted and cloud based applications are to thrive at the scale they are anticipated to do so then the need for a secure platform and location from which to operate from remains critical and where the Data Centre Risk Index can be part of the decision-making toolkit.

## **THE DATA CENTRE REMAINS THE MILLSTONE IN THE DIGITAL MIX**

With such a diverse range of products being developed, service providers are seeking to ensure successful delivery into end markets. At the same time resellers are differentiating their offerings as the market becomes more competitive. Meanwhile the data centre forever remains the millstone in the broadening digital mix.

The industrial scale of demand has led to a rise in mega-data centres which are fast becoming a staple of our global technology infrastructure, serving as the backbone of the digital economy. The growth of the internet is driving an enormous appetite for network capacity and data storage, creating a new class/size of data centres, requiring in some instances of upwards of 1 million sq ft that can scale along with internet growth.





## SUSTAINABILITY PAVING WAY FOR EXPANSION IN BOTH MATURE AND EMERGING LOCATIONS

It is of no surprise that demand for data centre space continues to climb providing the framework for today's rapidly expanding digital world. The total number of data centres around the world will peak at 8.6 million in 2017, and then begin a slow decline, predicts IDC.

A driver of that change has been the migration from on-premise facilities run by internal IT teams to 'mega data centres' operated by large service providers. Meanwhile the IDC also predicts that worldwide data centre space will continue to increase, growing from 1.58 billion square feet in 2013 to 1.94 billion square feet in 2018.

As occupiers look to best suited facilities in global locations, relocation or expansion strategy comes at a time when many organisations are also pursuing corporate social responsibility programs underpinned by green initiatives.

In an increasingly competitive world data centre operators are continuously striving to secure the best locations globally in terms of connectivity, storage, talent and compute resources for powering everything from e-commerce transactions to software development and testing.

Business operations within the data centre market inevitably generate a high demand for energy/electricity, so:

1

*How can the world's growing appetite for data centres align with this desire to ensure sustainability?*

2

*To what extent and more importantly where - geographically are corporates embracing alternative sources from renewables?*



## GREEN INITIATIVES SET TO GAIN TRACTION?

While data centres present a natural opportunity for sustainability improvements, since they typically use large amounts of power, the push for greener computing infrastructure is causing increasing numbers of organisations to rethink where they locate and how they're designing data centre space to meet requirements.

It is important to highlight that sustainability comes in a number of forms. While corporates are looking for ways to cut consumption levels technological advances illustrate the efficiency of modern day products and devices which operate much more efficiently. Although the grid doesn't know the difference between renewable and coal fired operations, different geographic areas are certainly known for their production of renewable energy with positive branding and corporate social responsibility also acting as secondary benefits in these cases. Through purchasing renewable energy sources and/or cutting back energy use and minimising environmental footprints, green initiatives certainly can cut bottom line operating costs.

With a rising number of data centre operators seeking sustainable sources to support their operations, the Nordics and Canada represent prime examples of countries where more sustainable and renewable options are already in place. Locations such as Iceland, Norway and Switzerland score highly within our index and with a large share of renewables tends to come a secure energy supply.







## MARKETS OF TODAY & TOMORROW - HOW IS SUSTAINABILITY IMPACTING THE DATA CENTRE LANDSCAPE?

But, in reality what proportion do these locations make up in terms of the overall global data centre market? With Europe attributable for approximately 20% of the global data centre market the Nordics only accounts for say less than 2% globally - if we add Canada into the mix this would potentially rise to say just 3%. While this reveals that proximity to market remains the key picture we do anticipate that these locations will develop a wider data centre platform - they must with sustainability measures and demands continuing to move up the agenda.

In contrast emerging markets elsewhere specific to the EU and inclusive of the likes of Czech Republic, Bulgaria, and Poland while remaining attractive locations are facing a fundamental issue, a lack of renewable energy sources. This has and will continue to hold these locations back from realising their full potential.

With energy security featuring highly in our index the reliance on the delivery of a new pipeline out of the Ukraine continues to have a downward drag on the rankings for these locations. As such it is inevitable that these markets are going to have to implement a shift in share of renewables to become more attractive to corporates, which are increasingly moving away from reliance on energy sourced from fossil fuels. At the same time, with proximity to end market remain all important we have started to see a number of providers investing in renewables elsewhere to run their data centres while still locating in markets close to end users - with Apple being an example of what we anticipate to be a growing trend.

Beyond energy security sheer market connectivity remains a key driver of corporate location strategy. We source global connectivity levels from Akamai's connectivity study for our index.



## CONNECTIVITY REMAINS A CRITICAL DECISION MAKING DRIVER

It's not just simply about the data centre and its facilities anymore; it's about the connectivity. Like power and cooling, connectivity is also essential for providing all the services in data centres.

Connectivity is governed by five key inputs:



**1. PRICE**



**2. BANDWIDTH**



**3. SECURITY**



**4. THE SHEER SPEED  
OF LIGHT AND  
HOW LATENCY CAN  
IMPACT CUSTOMER  
EXPERIENCE**



**5. AVAILABILITY OF  
THE RIGHT SPACES  
IN THE RIGHT PLACES**

Each situation demands its own specific assessment of the optimal mix. One business may need a lot of low cost bandwidth, while another demand low latency or the highest availability and is prepared to increase its budget and locate accordingly to secure it.

As companies continue to look to centralise data the data centre naturally grows in its importance. Many companies rapidly outgrow their original internet access and demand increased speeds with 100% uptime together with the standard issues of security, environment and availability of managed services.

### FINDING THE OPTIMAL BALANCE

While proximity and end market access is of course important in enabling the delivery a greater range of services to customers at a more cost effective price point, this will not always come at the extent of compromising on good connectivity, diverse power and data security. As such, for many it is more about finding a logical location which provides the best fit – how good is the internet connectivity, what are the peering arrangements in place and what is the latency expectation?

## GET YOURSELF CONNECTED - WHICH MARKETS ARE ATTRACTIVE AND WHY?

Data is becoming a more important tool for businesses every day, in almost every industry. Smaller businesses are using bigger data and the market for storage, collaboration and information management tools is on an upward curve.

Subsequently, a number of markets within our index score highly by offering an extremely robust and connected marketplace both in terms of operation and delivery. Markets from Asia Pacific such as Korea, Hong Kong, Singapore and Japan score highly as a result. While in EMEA, Switzerland and Sweden offer strong bandwidth rankings within our index, however, this is not necessarily reflected in internet traffic. Amsterdam remains the gateway to Europe and Frankfurt has seen stellar growth over the last few years driving a continued appetite for data centre colocation space.

In other scenarios bigger players are taking matters into their own hands in order to locate in markets offering up favourable alternative criteria. Locations are being chosen based on other factors with connectivity installed, in some instances on a bespoke basis to boost service offerings.

Examples of this include Apple's decision to locate in Ireland and lay their own trans-Atlantic private network infrastructure. With key pinch points developing in respect of bandwidth, one could anticipate other leading enterprises being prepared to invest in a similar way.

## NATURAL DISASTERS - ASSESSING NOT JUST THE VULNERABILITY BUT ALSO THE COPING CAPACITY OF LOCATIONS

When assessing risk it is important not only to assess the vulnerability of a location but also the coping capacity in an event of a natural disaster.

### BUT WHAT EXACTLY DO WE MEAN BY THESE TWO TERMS?

Vulnerability comprises the components of susceptibility, lack of coping capacities and lack of adaptive capacities in relation to social, physical, economic and environmental factors which make systems susceptible to the impacts of natural hazards, the adverse effects of climate change or other transformation processes. Moreover, the term vulnerability covers factors which comprise the abilities and capacities systems in order to cope with and adapt to the negative impacts of natural hazards.

The terms coping capacities comprises various abilities of societies and exposed elements to minimise negative impacts of natural hazards should they occur and climate change through direct action and the resources available. Coping capacities encompass measures and abilities that are immediately available to reduce harm and damages in the occurrence of an event.

Both interrelate, while overall risk associated with natural disasters carries the highest weighting within our index at more than 15%.

Indonesia, Hong Kong and Thailand within our index all fall into high risk categories in terms of natural disaster exposure. While Norway has cemented its index position by a lower risk environment. Elsewhere, Qatar and the UAE also represent lower risk alternatives.

Despite this a vast amount of data centres globally continue to be located within high risk locations, as service providers focus on proximity and accessibility of end markets as an acceptable trade-off in relation to the risks natural disasters pose to their infrastructures.







## CORPORATION TAX – A GOVERNMENT LEVER FOR INWARD INVESTMENT

While making up just 6.4% of our overall index corporation tax is still regarded as a strong incentive when considering where to locate data centre facilities.

A number of locations have grown in attractiveness as a function of a competitive tax environment and, where able to attract major brands over a longer period the critical mass associated with occupancy within these markets has paved the way for further expansion.

Ireland is a primary example of this, with the second lowest corporate tax environment within our index and it is no secret that most of the global leaders in the IT Infrastructure sector operate large data centres in Dublin or are building large data centres there as a function of a favourable tax environment.

US companies looking to tap into Europe have typically started to use Dublin as a key landing point before expanding eastwards into more traditional markets. The likes of Google, Microsoft, AWS, Apple, Facebook, Digital Realty, and a long list of IT services providers, have already chosen to locate in Ireland with Amazon, Google, Microsoft, Apple and Facebook, having invested more than \$2 billion during 2014 and 2015 to date and further expansion plans in the pipeline.

## BREAKING AWAY FROM HERD MENTALITY

While Ireland offers a tax favourable market its attractiveness is rather mixed when it comes to alternate criteria within our index. So, in reality is it possible a more balanced environment elsewhere may overcome relocation strategies focused so selectively around existing brand clustering such as that seen in Ireland?

Looking eastwards within EMEA there is certainly a case for reconsideration. Bulgaria, not only offers a favourable tax environment but also strong connectivity and low cost energy.

Further afield, in well established markets of Singapore and Hong Kong these locations continue to benefit from an attractive tax environment and this is reflected in their overall index ranking of 7th and 11th respectively.

# CONCLUSION

As the digital world changes at a phenomenal pace and businesses strive to use IT to gain competitive advantage, the pressure on decision-makers has arguably never been greater. The Cushman & Wakefield Data Centre Risk Index gives insight into the macro locational view but so much more needs to be taken into account. These include the likes of information security, soaring IT adoption rates in emerging markets, data privacy, increasing obsolescence of existing facilities (with substantial residual book values, liabilities and vacancy) and how to manage and store the sheer volume of data being generated.

On the flip side, the technology and telecommunications arena is an exciting place to be with the advent of 5G, continued M&A activity and corporate divorces. Add to that advancement in space technology and the expectation for increasing reliance on low orbit satellites for connectivity, we can see the industry community begin to see beyond our own backyards.

Comparing the Cushman & Wakefield Data Centre Risk Index 2016 to the last edition in 2013, we have seen sentiments change and broaden in what is a relatively short period of time. This only serves to underpin our observation that when it relates to data centres, however hard, endeavour to anticipate everything – to assume will only lead to errors in judgment.

# ABOUT CUSHMAN & WAKEFIELD


Cushman & Wakefield is a leading global real estate services firm that helps clients transform the way people work, shop, and live. Our 43,000 employees in more than 60 countries help investors optimise the value of their real estate by combining our global perspective and deep local knowledge with an impressive platform of real estate solutions. Cushman & Wakefield is among the largest commercial real estate services firms with revenue of \$5 billion across core services of agency leasing, asset services, capital markets, facility services (C&W Services), global occupier services, investment & asset management (DTZ Investors), project & development services, tenant representation, and valuation & advisory. To learn more, visit [www.cushmanwakefield.com](http://www.cushmanwakefield.com) or follow @CushWake on Twitter.

 **£191bn**  
In transaction value

 **43,000**  
Employees

**4.3bn**  
Sq Ft Managed 

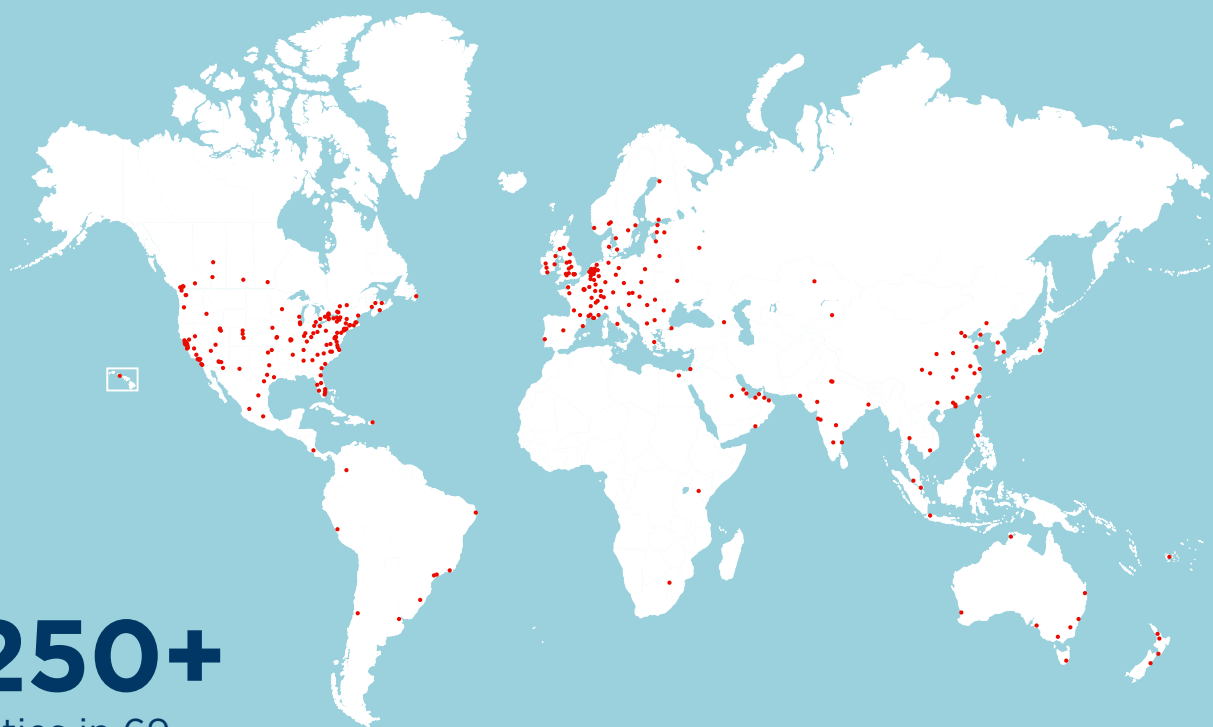
**£5bn**  
In revenue 

  
Offices in more than **60** countries



Confidently  
Global,  
Expertly  
Local





**250+**

Cities in 69  
Countries

● Cushman & Wakefield offices







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