

Ireland's Data Hosting Industry

2018 Q1 Update

"Irish Data Centres, an Industry of Substance"



Host In Ireland

bitpower
energy solutions

Ireland's Data Hosting Industry

2018 Q1 Update

April 2018

Foreword

This research has been carried out by Bitpower on behalf of Host in Ireland to examine the opportunities and risks associated with the digital asset hosting industry in Ireland. With \$71 Billion of ICT Services exported in 2016ⁱ, Ireland clearly has a thriving digital economy. It boasts the biggest names in the tech industry.

This report attempts to build on the baseline set out in our 2017 report in terms of the sustainability of the data industry.

By providing the most timely and accurate update on data centre activity in the Irish market, we believe that this baseline will act as

a useful reference for policymakers. This will be beneficial to Ireland as we look to continue our leadership in the creation, retention and exporting of digital products for the long term.

Garry Connolly

President & Founder - Host in Ireland

Updated Data, Analysis and Dashboard

This supplement augments our 2017 report supported by Host in Ireland and the Sustainable Energy Authority of Ireland - "Ireland's Data Hosting Industry 2017" which was published in November 2017. We plan to provide a quarterly update on the main data and we welcome any inputs, corrections, or contributions. Both documents are available at this [link](#).

We have updated our map of data centre facilities. Dublin is still the main location due to its legacy of clusters of hyperscale and colocation facilities in proximity to international fibre networks connecting Ireland to the US and EU. Outside of Dublin, a number of new schemes are under consideration. Apple's postponement in Athenry is also accounted for in this report.



Our objective is to continue to maintain a watch on the growth of the commercial data hosting industry in Ireland. We will report in an aggregated manner, and all our data comes from publically available sources.

Several new data centre facilities came on line in 2017. These include facilities built by InterXion, EdgeConneX, Microsoft, and Facebook. There is now estimated to be 480 MW of data centre capacity in operation in Ireland. While construction continues on a further 110 MW in 2018, we have also seen a number of large facilities receive planning approvals.



While many of the approved facilities have a roadmap to electricity grid connection, self-generation using natural gas is a growing trend. It is expected this will reduce the pressure on electricity infrastructure. We will adjust our model to account for primary energy when such facilities come on line.

Research and analysis performed by:

David McAuley

CEO - Bitpower

Data Market Developments

Our study revealed that data centres of different types tend to cluster and evolve together. In 2017, we saw a continuation in the growth of Hyperscale, Colocation and Colocation Wholesale data hosting facilities.

There are forty-six data centre facilities in operation in Ireland in 2018. Hyperscales continue to dominate in terms of scale, with 74% of the MW capacity. Colocation and managed service providers remain healthy with all growing proportionately.

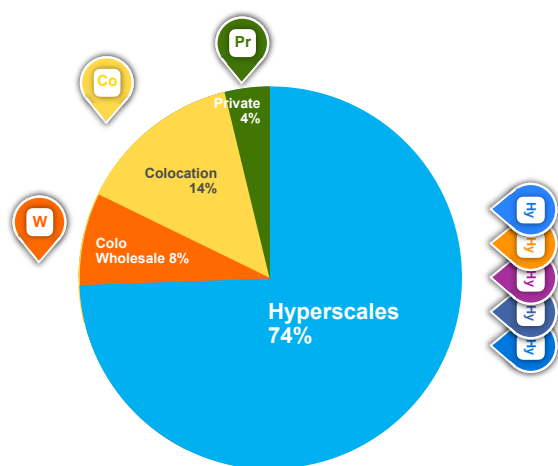


Figure 1 - Relative scale of digital hosting types in Ireland in 2017.

Hyperscale Data Centres



Microsoft, Amazon, Google, and Facebook all now have operational facilities in the greater Dublin area. Construction continues, with Facebook growing its Clonee campus, Microsoft planning for more at Grange Castle, and Amazon further developing its facilities in Clonsaugh and Tallaght.

Colocation Wholesale



Colocation Wholesale data centres are fast becoming a model to accommodate hyperscale expansion. EdgeConnex completed two new facilities in 2017, with another planned in 2018. The K2 Datacentres facility in Ballycoolin is due to open in 2018. A new project in Ballycoolin received planning permission in Q1 2018.

Colocation Data Centres



The combined colocation power in Ireland is 100 - 120MW across 12 buildings. InterXion opened its latest facility in 2017. Cork Internet Exchange commenced an expansion in Cork in 2018. Digital Realty received planning permission for a new data hall in Profile Park.

Private Data Centres



We have maintained our estimate of 30MW to capture the scale of private data centres in Ireland. We are unaware of any significant developments in 2017.

Edge Data Centres



We have not identified any new Edge data centres in Ireland in this update, and we have not estimated their growth in our model, but we do expect them to begin appearing in the next twelve months. The question of Edge versus Fog terminology remains open to discussion

County Meath

Clonee
Local Authority: Meath County Council

1

Facility

Operational 2018 Q1: 20 MW
Construction: 36 MW
Planning Permission: 56 MW
Planning Application: 0 MW
Masterplans: 56 MW

Dublin North West

Blanchardstown / Ballycoolin / Dublin 15
Local Authority: Fingal County Council

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Facilities

Operational 2018 Q1: 85 MW
Construction: 22 MW
Planning Permission: 101 MW
Planning Application: 0 MW
Masterplans: 38 MW

Dublin North East

Clonsilla / Dublin 17
Local Authority: Dublin City Council

10

Facilities

Operational 2018 Q1: 87 MW
Construction: 10 MW
Planning Permission: 0 MW
Planning Application: 0 MW
Masterplans: 0 MW

Dublin South West

Grange Castle / Profile Park / Dublin 22
Local Authority: SDCC

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Facilities

Operational 2018 Q1: 188 MW
Construction: 49 MW
Planning Permission: 140 MW
Planning Application: 0 MW
Masterplans: 10 MW

Dublin South

CityWest / ParkWest / Dublin 24
Local Authority: SDCC

8

Facilities

Operational 2018 Q1: 97 MW
Construction: 0 MW
Planning Permission: 0 MW
Planning Application: 20 MW
Masterplans: 20 MW

Metro Dublin Area

Map Legend



Hyperscale



Co-Location



Colocation Wholesale



Private Data centres



Edge Data centres

Map shows operational and known planned facilities.
Callouts in blue refer to operational facilities.

Google My Maps

Map data ©2018 Google



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Scale of Ireland's Data Industry in 2018

Masterplans
Estimated
340 MW

Planning Applications
Currently in the Planning Process
40 MW

Planning Permission
Approved
320 MW

Construction
Projects currently in Development
110 MW

Data Centre Capacity
Operational in 2018 Q1
480 MW

Power availability defines the size of any data centre operation. Without a guarantee of power availability, the data centre business model would not work. Facilities are built never to exceed the power available.

There are forty-six operational data facilities of various types operating in Ireland in 2018. Ten new buildings are in construction in 2017, and a further twelve have approved planning permission. We have identified five data centres in the planning process, and up to twenty data halls indicated in masterplans submitted for planning.

To calculate the power capacity, we have aggregated data from several sources. We first calculated the total maximum power capacity across all facilities identified using a methodology described in Appendix II of the 2017 report. Power capacity relates to the infrastructure required to deliver power through the national grid.

480 MW

Total connected data centre power capacity in Q1, 2018

110 MW

data centres in construction in 2018

320 MW

with full planning permission

40 MW

in the planning process

340 MW

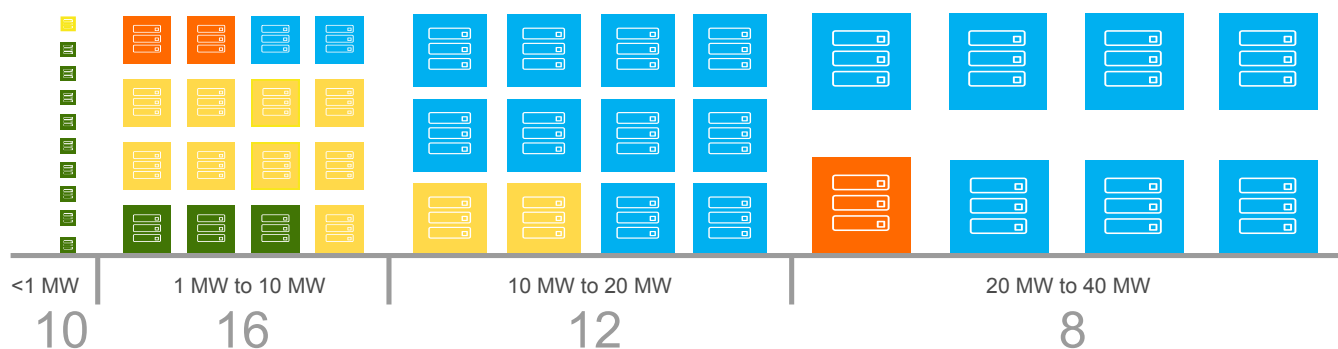
Masterplans

~1,200 MW by 2024

Total requirement for power capacity

Ireland Hosts Commercial Data Centres of all Sizes

Forty-six operational data centres in Ireland in Q1 2018



Investment in Data Centres

Our estimates of construction investment in data centres have been updated to account for industry developments since our 2017 report. In 2017, €1.2 Billion was invested in constructing data facilities. We expect annual investment of approximately €1.1 Billion in 2018, €1.4 Billion in 2019, €1 Billion in each of the years 2020, and 2021, as shown below. The total cumulative investment to date was €4.3 Billion. By 2021, almost €9 Billion will have been invested. See Figure 2 below.

The revised data reveals a more steady growth trend, with the model capturing more new projects for future years. Our model selects an investment year for a given project, but in reality expenditure during the construction of a data facility may span several years. The

diversity of projects at various stages tends to smooth out our projection.

Our model assumes the postponement of the Apple development in Athenry beyond 2021. Amazon's Project G in Blanchardstown was delayed by nine months in 2017, so its projected construction spend was moved out of 2017/2018 to 2018/2019.

These numbers represent the investment in land, buildings and energy infrastructure only. The computer servers, storage, and racks contained in data centres are a separate investment. We use estimates of between €3M and €7.5M per MW of data centre capacity depending on the type of facility.

Construction Investment 2009 - 2021

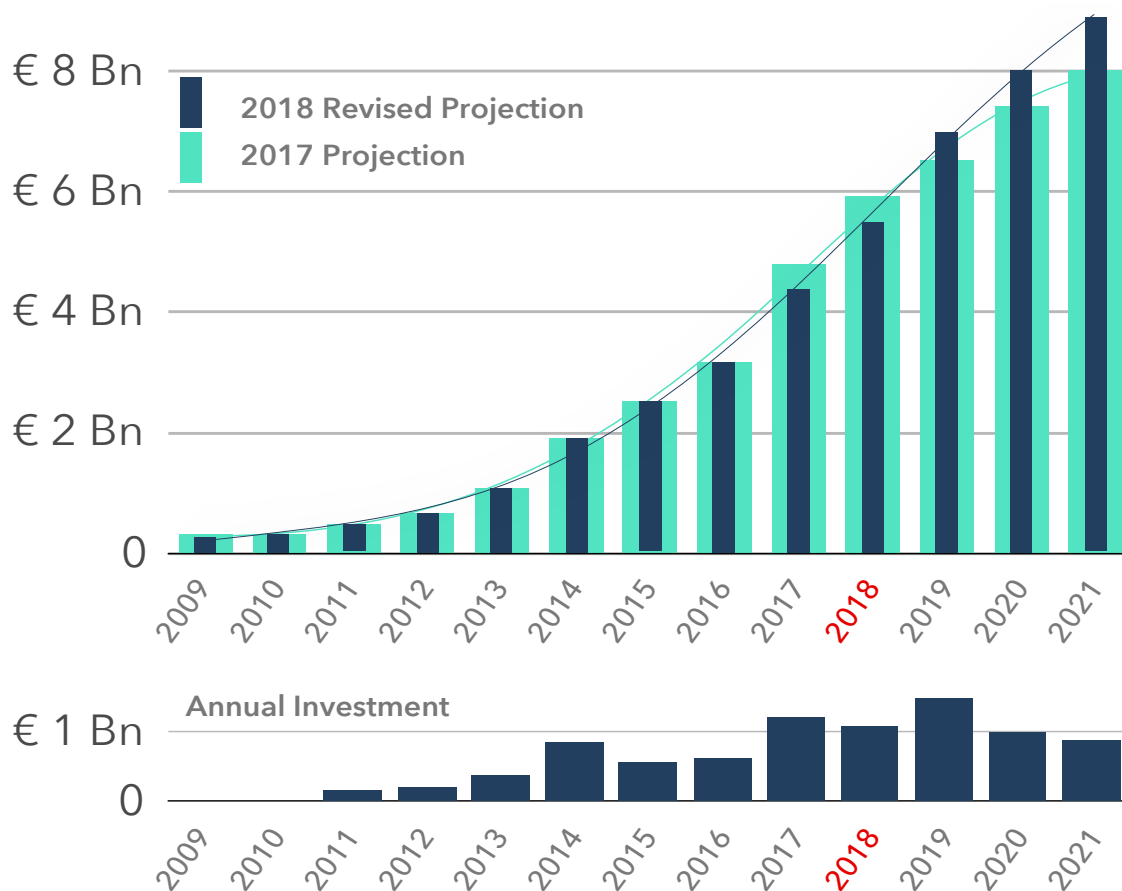


Figure 2 – Construction Investment in Data Centres 2009 – 2021 – Cumulative and Annual.

Energy use in Data Centres

The numbers shown in the previous section indicate the scale and growth of the installed and planned power capacities of data centres in Ireland. It is important to note that these are maximum numbers. The actual energy demand is lower in practice. Many factors affect power utilisation: demand for data; client build-out rates; outside temperature, etc. While these factors are sometimes out of the control of the operator, demand profiles for data centres tend to be relatively flat on a day-by-day basis.

It is not unusual for power utilisation in data centres to be as low as 30% on an annualised basis. It can be assumed that hyperscale operators are better placed to optimise energy demand to avoid over-provisioning, and could potentially average a demand of 70% of their power capacity.

The diagram in Figure 3 below (available from "Advanced concepts for Renewable Energy Supply of Data Centres"ⁱⁱ) demonstrates the difference between power design capacity and operational capacity over the initial lifecycle of a data centre.

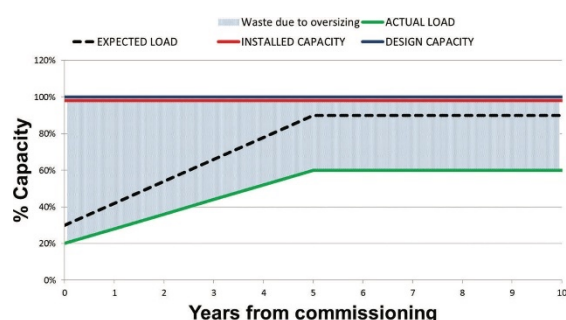


Figure 3 - Ramp-up of data centre power utilisation.

We have applied a power utilisation factor of 42.5% across the industry to reach an estimate of the total energy use. This is justified for our study as many of the data centres we have examined have only recently been constructed, and will not necessarily have

been fully fitted out. Our model has been adjusted to reflect this.

42.5%

Assumed annual power utilisation factor for data centres.

1.56 TWh

Estimate of annual energy use 2017

The total energy use for all operational data centres in Ireland is estimated to be 1.56 TWh in 2017. Ireland's total electricity use in 2017 is not yet available (we have used an estimate of 28.4 TWh). Data centres represent approx. 5.5% of Ireland's electricity use – Figure 4.

The world's data centres used 416.2 TWh in 2016ⁱⁱⁱ. Ireland's data centre energy use represents 0.34% of the data industry total.

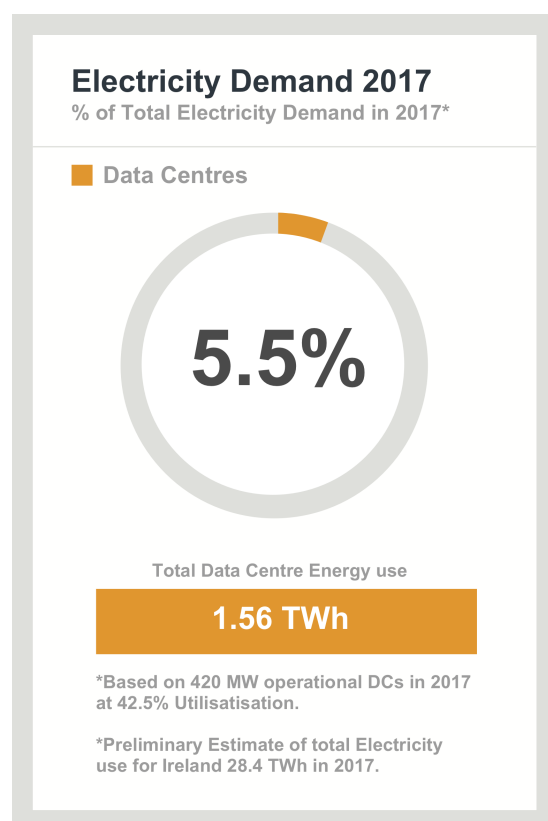


Figure 4 - Data Centre energy use as a percentage of Ireland's total electricity use in 2017 - Provisional.

Q1 2018
Updates and revisions

Change

2017

Masterplans
Estimated
340 MW

+ 100 MW

Masterplans
Estimated
240 MW

Planning Applications
Currently in the Planning Process
40 MW

- 40 MW

Planning Applications
Currently in the Planning Process
80 MW

Planning Permission
Approved
320 MW

+ 140 MW

Planning Permission
Approved
180 MW

Construction
Projects currently in Development
110 MW

- 40 MW

Construction
Projects currently in Development
150 MW

Data Centre Capacity
Operational in 2018 Q1
480 MW

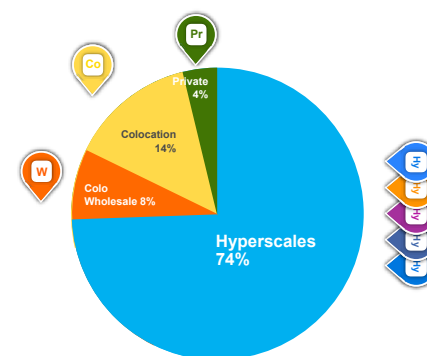
+ 60 MW

Data Centre Capacity
Operational in 2017 Q4
420 MW

Digital Hosting Q1 2018 Update

Data Centre Types

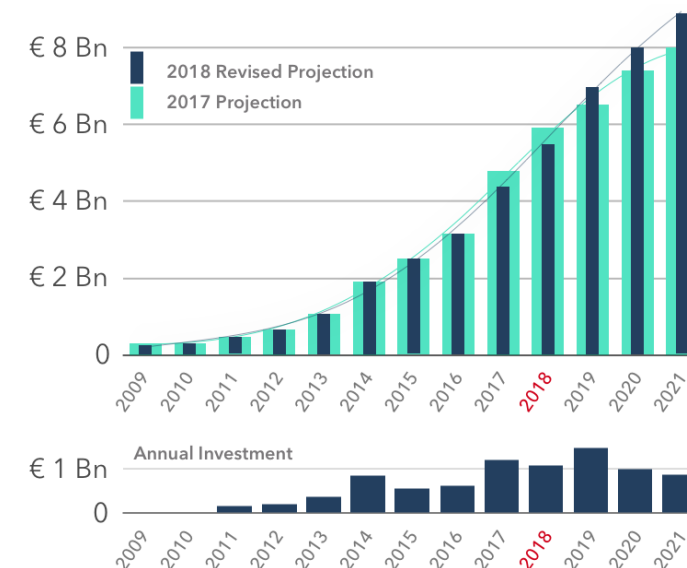
Operator business model



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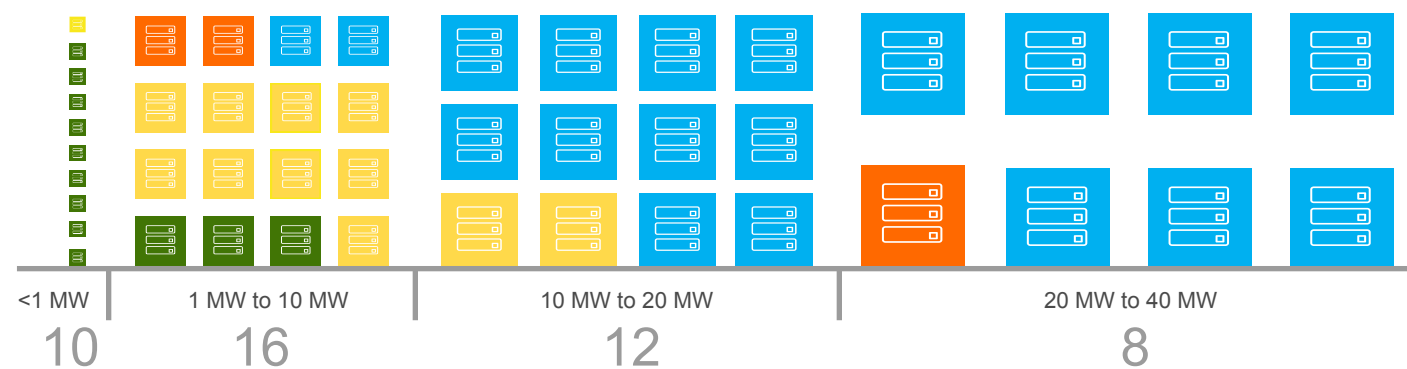
Construction Investment 2009 - 2021

Cumulative and Annual investments in data centre facilities



Ireland Hosts Commercial Data Centres of all Sizes

Forty-six operational data centres in Ireland in Q1 2018



46
Data
Centres

€1Bn
Annual
Investment

>25%
Growth in
2017

"Irish Data Centres, an Industry of Substance"

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