



*This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649972.*

# **Making the Business Case for Energy Efficiency in Data Centres**

*Lessons learned evaluating near 300 public sector data centres in Europe*

Dr Rabih Bashroush

Data Centre World, Frankfurt, 29<sup>th</sup> November, 2017

<https://www.dceureca.eu>

€2,200B

EU Public Sector  
Spending (19% of  
GDP)



## Aim

Assist the public sector with the uptake of innovative energy efficient and environmentally sound data centre products and services.



maki Consulting GmbH  
Life cycle expert services



Ireland

UK

Netherlands

Germany





Impact





>15 GWh

Per year of  
electricity savings  
were identified.

**Supported Pilots  
in 3 countries,  
and other  
engagements in  
5 more.**

Impacting over  
300 data centres.



**Organised 13  
events across  
Europe.**

with 1 more to go.





# 300

professionals  
trained, expecting  
to reach 500 by  
the end of the  
project.





Helped shape  
various European  
policy initiatives  
and standards.



**GPP**



Energy Efficiency Directive

EN50600-99-2



# Lessons Learned

A person is rappelling down a dark, craggy rock face. The person is wearing a yellow shirt and dark pants, and is positioned in the upper center of the frame. The background is a dramatic sky at sunset or sunrise, with soft orange and pink clouds. In the lower part of the image, a body of water is visible, reflecting the light from the sky. The overall scene conveys a sense of adventure and challenge.

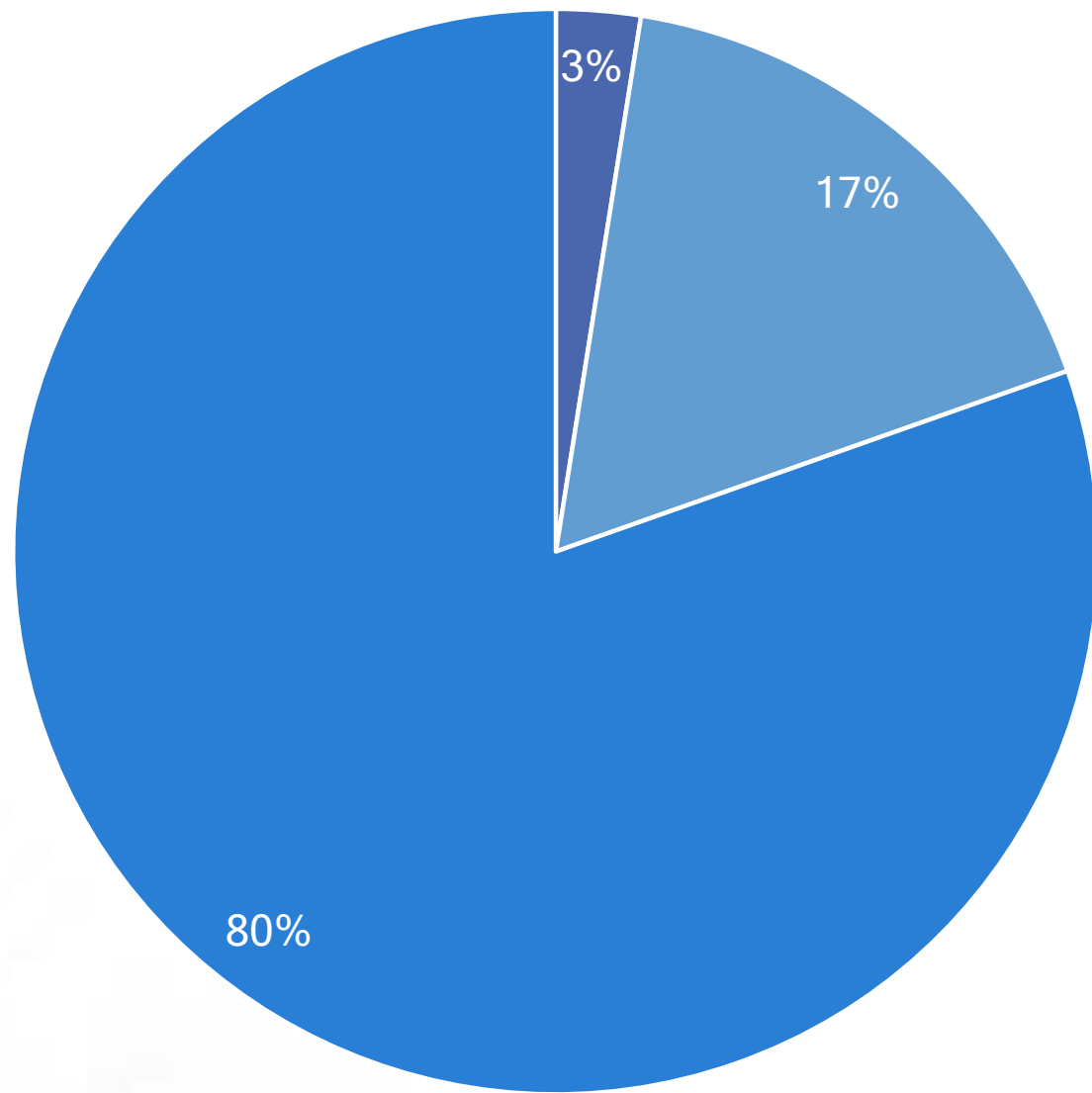
## Challenges

- Maintenance Costs
- Maintaining availability
- Rightsizing new builds
- Procurement
- Insufficient Priority
- Technical landscape



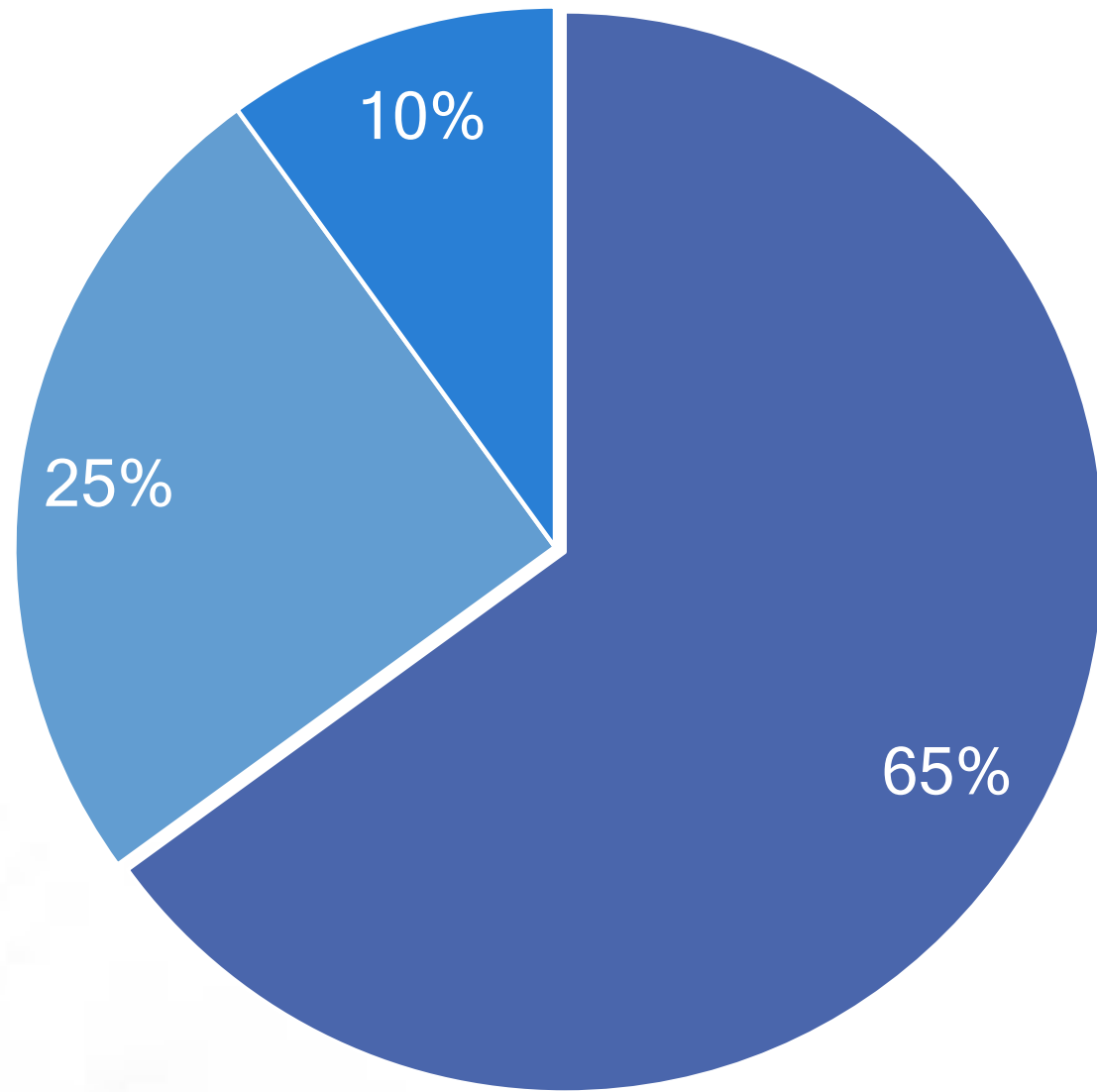


**Power Usage  
Effectiveness (PUE)**



■ > 125   ■ 25 to 125   ■ up to 25

**Data centre size  
(in racks)**



■ Servers ■ Storage ■ Networking

**Energy Consumption  
breakdown by IT  
Equipment type**

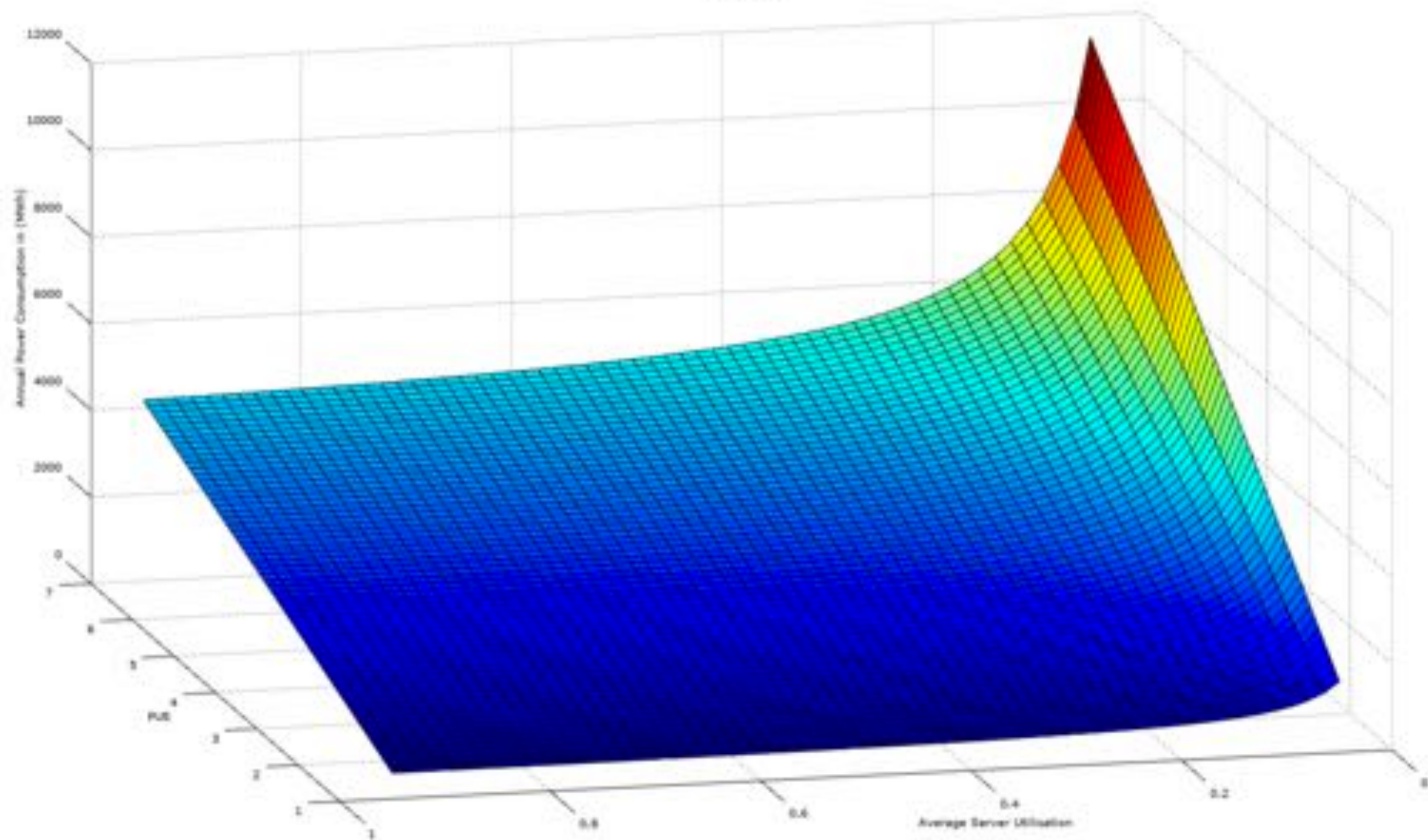






**Server Utilisation**





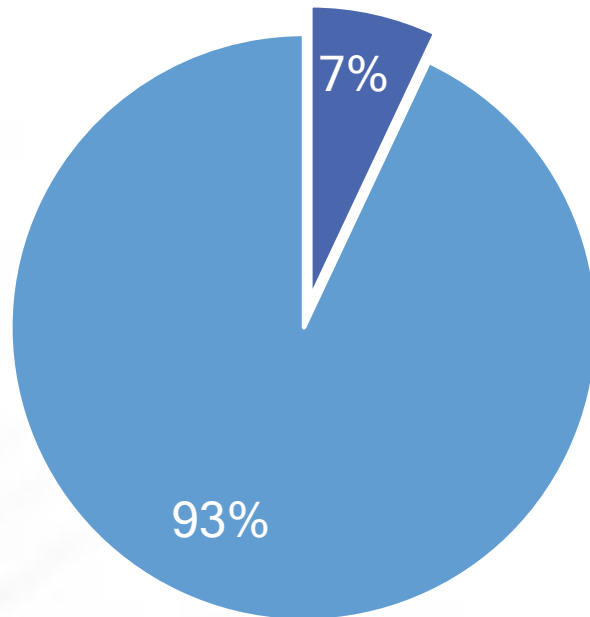


## Points affecting server utilisation

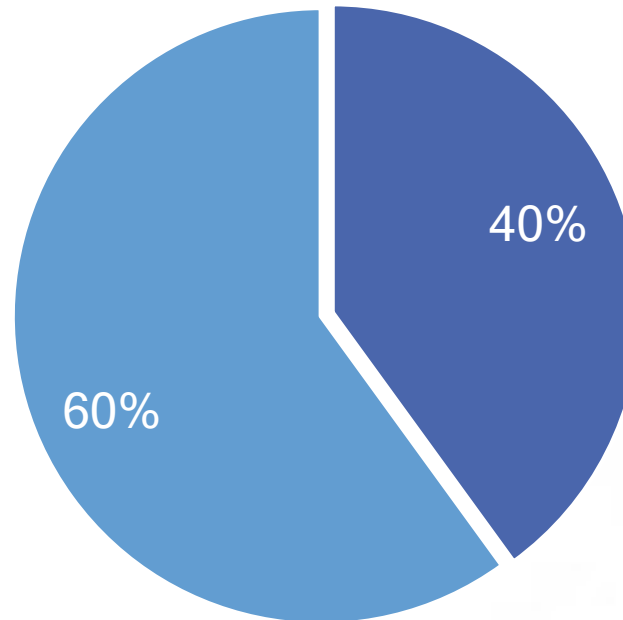
- Active – Active / clustering deployments
- Peak utilisation vs performance degradation
- Ensuring there is enough capacity in the system to cater for workload peaks
- Having the right server configuration for the workload

# Server Distribution

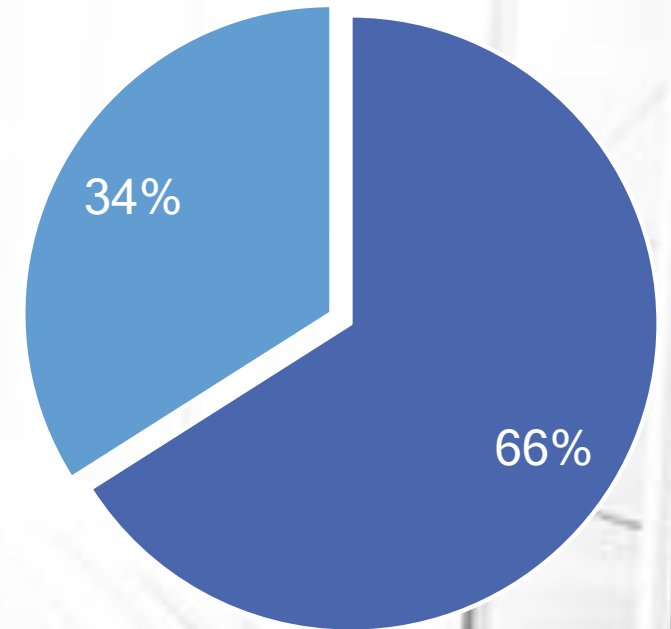
Compute Capacity



Age



Energy Consumption

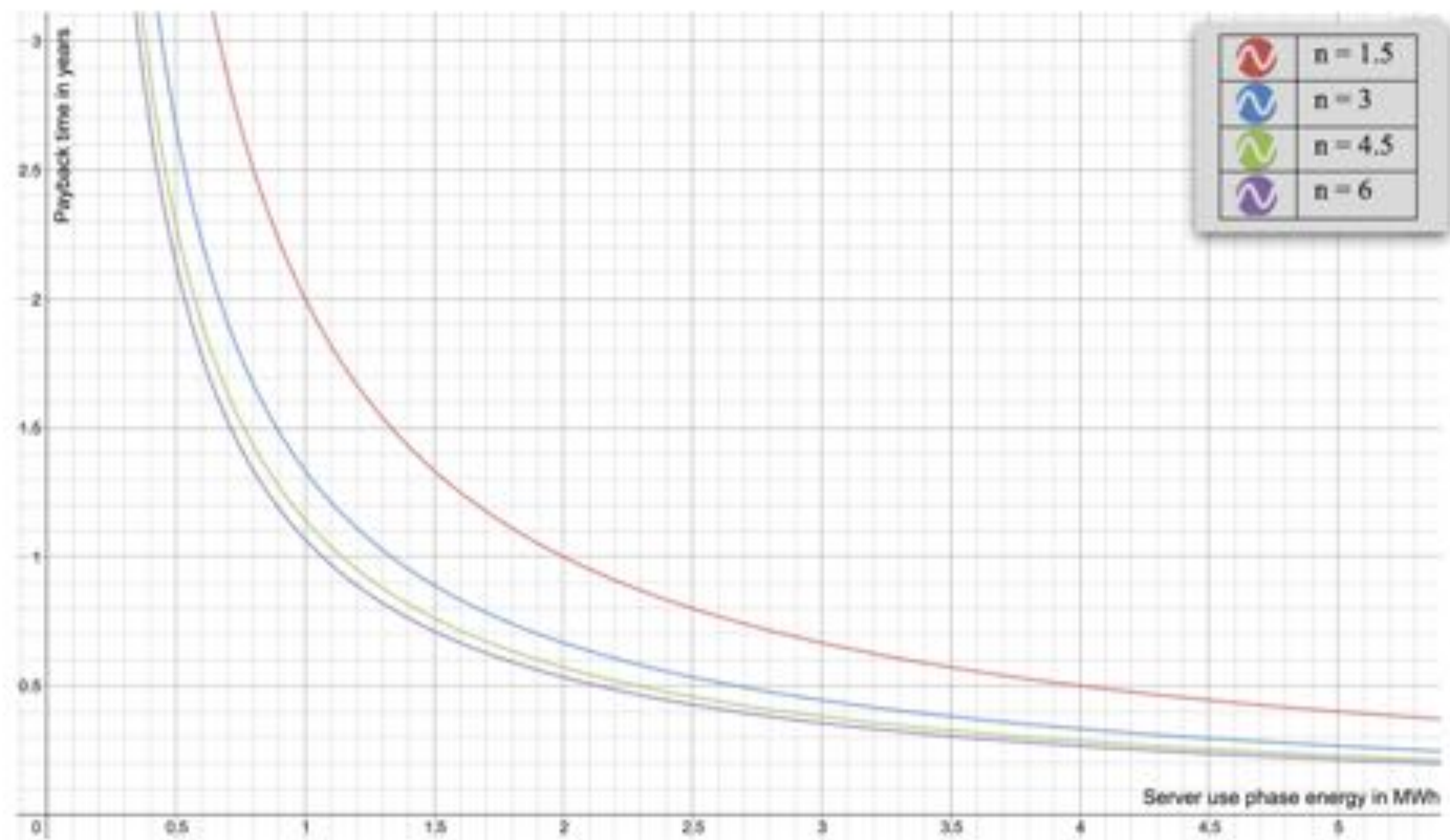


■ > 5 years old

	Scenario	PUE	$\beta$	Annual Use Phase Energy in KWh (for running workload $\omega$ )					
				Hardware 1 (7.5Y old)	Hardware 2 (6Y old)	Hardware 3 (4.5Y old)	Hardware 4 (3Y old)	Hardware 5 (1.5Y old)	Hardware 6 (Current)*
On-Premise (non-virtualised)	Worst	3	5%	51,372,685	15,414,061	12,840,312	6,257,229	2,453,698	2,093,779
	Average	2	10%	17,708,754	5,533,001	4,617,433	2,356,780	952,302	820,422
	Best	1.5	25%	5,838,699	2,015,383	1,688,826	950,967	406,652	356,373
Colocation (non-virtualised)	Worst	2.5	5%	42,810,571	12,845,052	10,700,260	5,214,358	2,044,749	1,744,816
	Average	1.8	10%	15,937,879	4,979,702	4,155,690	2,121,102	857,072	738,380
	Best	1.3	25%	5,060,206	1,746,666	1,463,650	824,172	352,433	308,857
On-Premise (virtualised)	Worst	3	6%	43,102,834	13,042,542	10,868,925	5,349,876	2,111,950	1,806,064
	Average	2	30%	6,682,286	2,370,976	1,988,917	1,146,976	496,637	436,802
	Best	1.5	60%	2,944,252	1,185,352	998,841	633,394	287,041	255,673
Private Cloud	Worst	2.5	7%	30,996,498	9,457,166	7,883,993	3,918,139	1,556,537	1,333,795
	Average	1.8	30%	6,014,058	2,133,878	1,790,026	1,032,279	446,974	393,122
	Best	1.3	60%	2,551,685	1,027,305	865,662	548,941	248,769	221,583
Public Cloud	Worst	2	7%	24,797,198	7,565,733	6,307,194	3,134,511	1,245,229	1,067,036
	Average	1.5	40%	3,977,983	1,481,792	1,245,265	746,813	329,759	291,637
	Best	1.1	70%	1,942,527	807,147	680,852	440,725	201,546	179,958

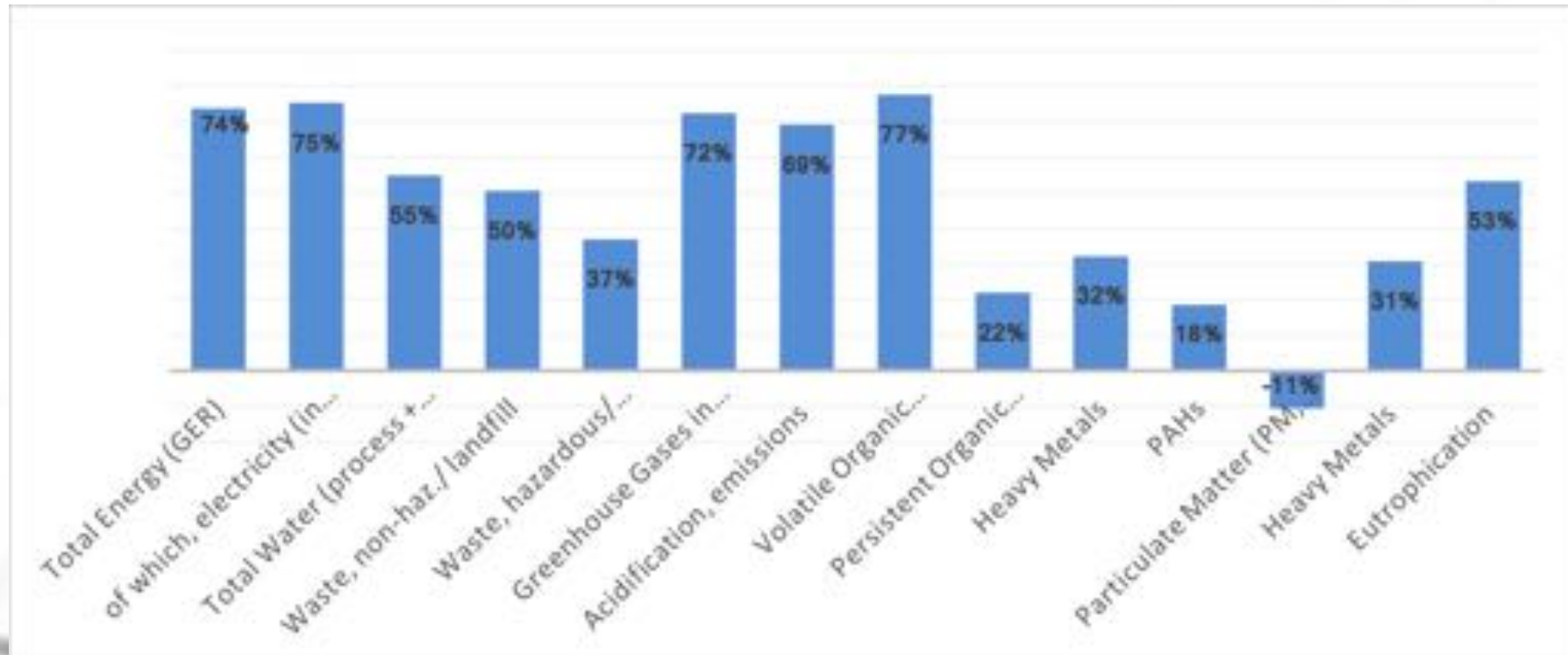
\* As of 2016





## Points affecting hardware refresh

- Budget availability and accounting practices
- Misconception about environmental impact



## The major impact areas for PPI

- Facility
  - Right-sizing DC capacity
  - Right-sizing availability/redundancy
- IT
  - Optimise hardware refresh
  - Increase utilisation





# FUTURE



...LOADING...

# Training Certificates

- 1) Register/login: <https://www.dceureca.eu>
- 2) Scan code below and request certificate  
(code and URL are also on the back of the leaflet)



[https://www.dceureca.eu/?page\\_id=3055](https://www.dceureca.eu/?page_id=3055)

