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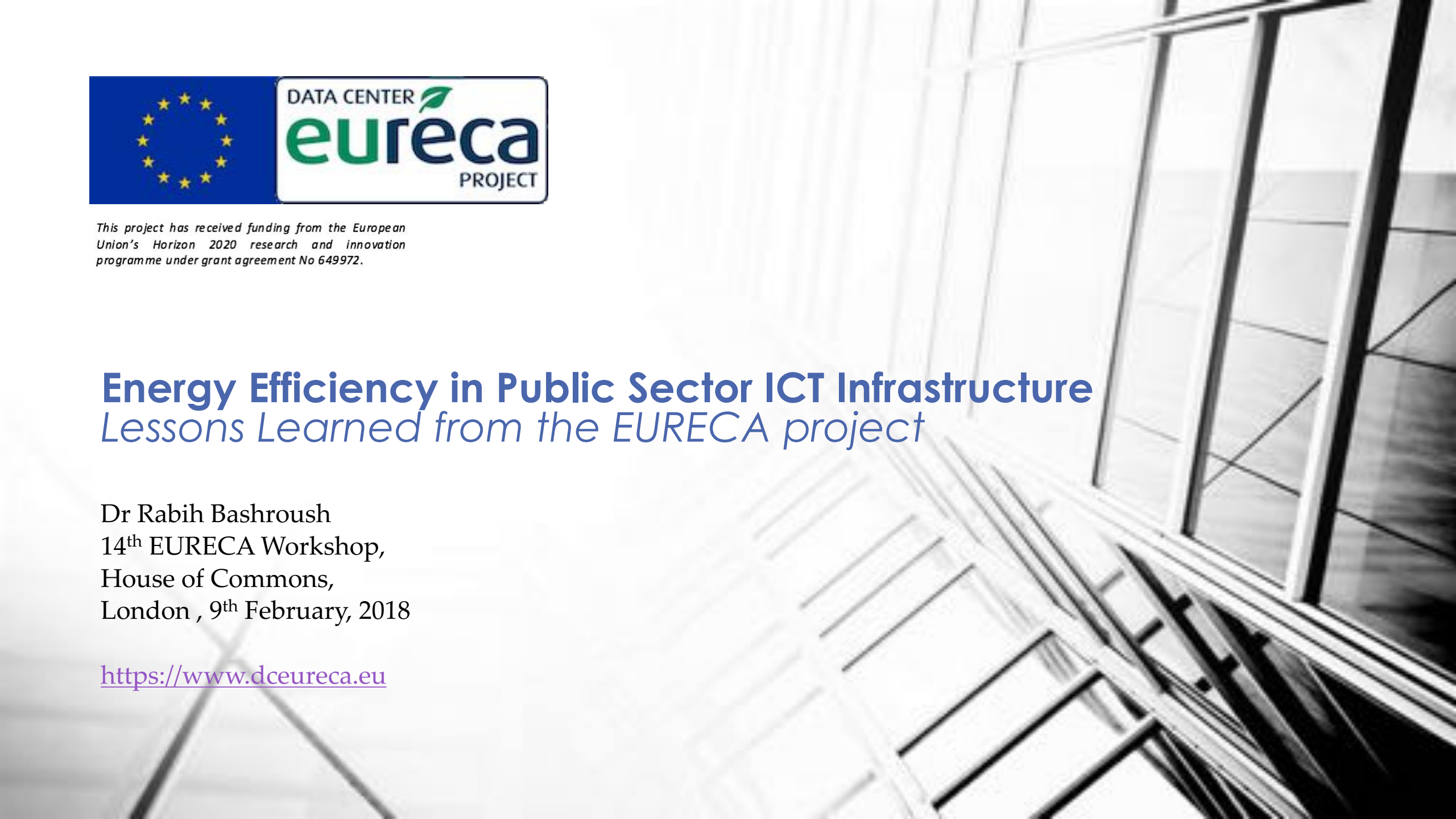
Energy Efficiency in Public Sector ICT Infrastructure

Lessons Learned from the EURECA project

Dr Rabih Bashroush

14th EURECA Workshop,
House of Commons,
London , 9th February, 2018

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.

DATA CENTER eureca PROJECT

Impact

>45 GWh

Per year of electricity savings were identified.

Supported Pilots in 3 countries, and other engagements in 4 more.

Impacting over 350 data centres.

Organised 14 events across Europe.

500+
professionals
trained.

Helped shape various European policy initiatives and standards.

EMAS
VERIFIED ENVIRONMENTAL MANAGEMENT

Ecodesign
Your Future

Energy Efficiency Directive

EN50600-99-2

Green Public Procurement Criteria

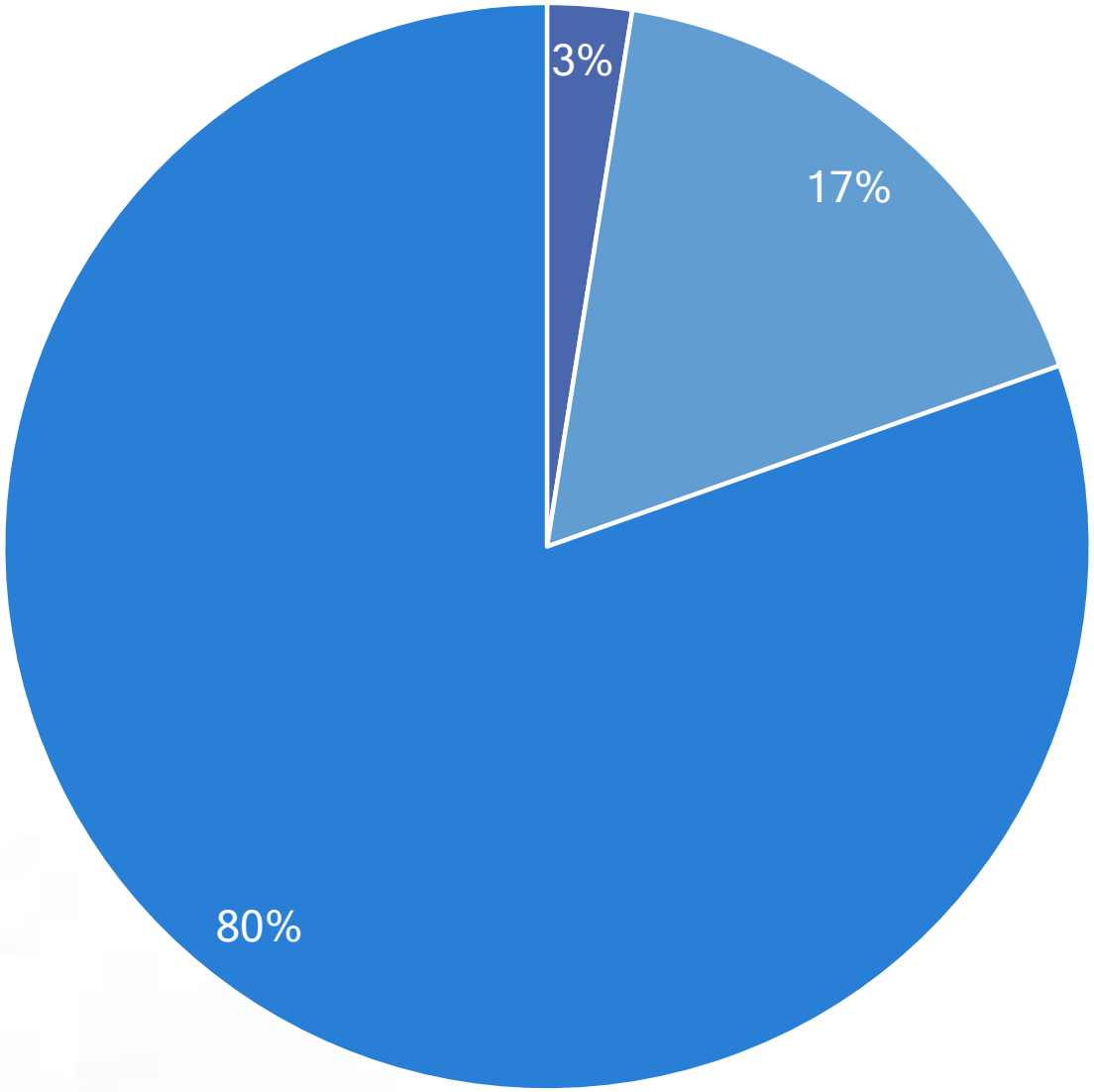
Lessons Learned

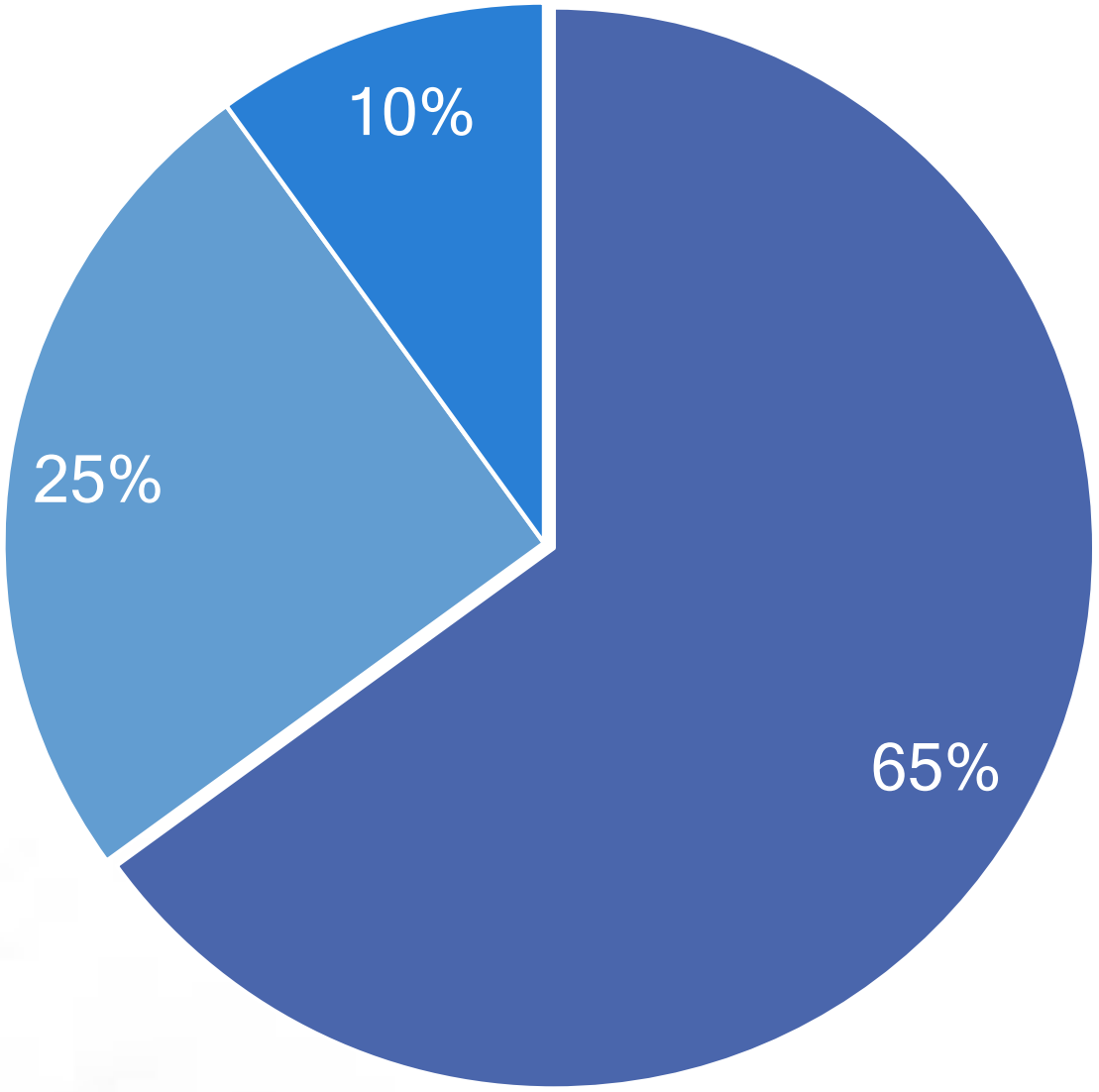
Challenges

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

Power Usage Effectiveness (PUE)

Data centre size (in racks)

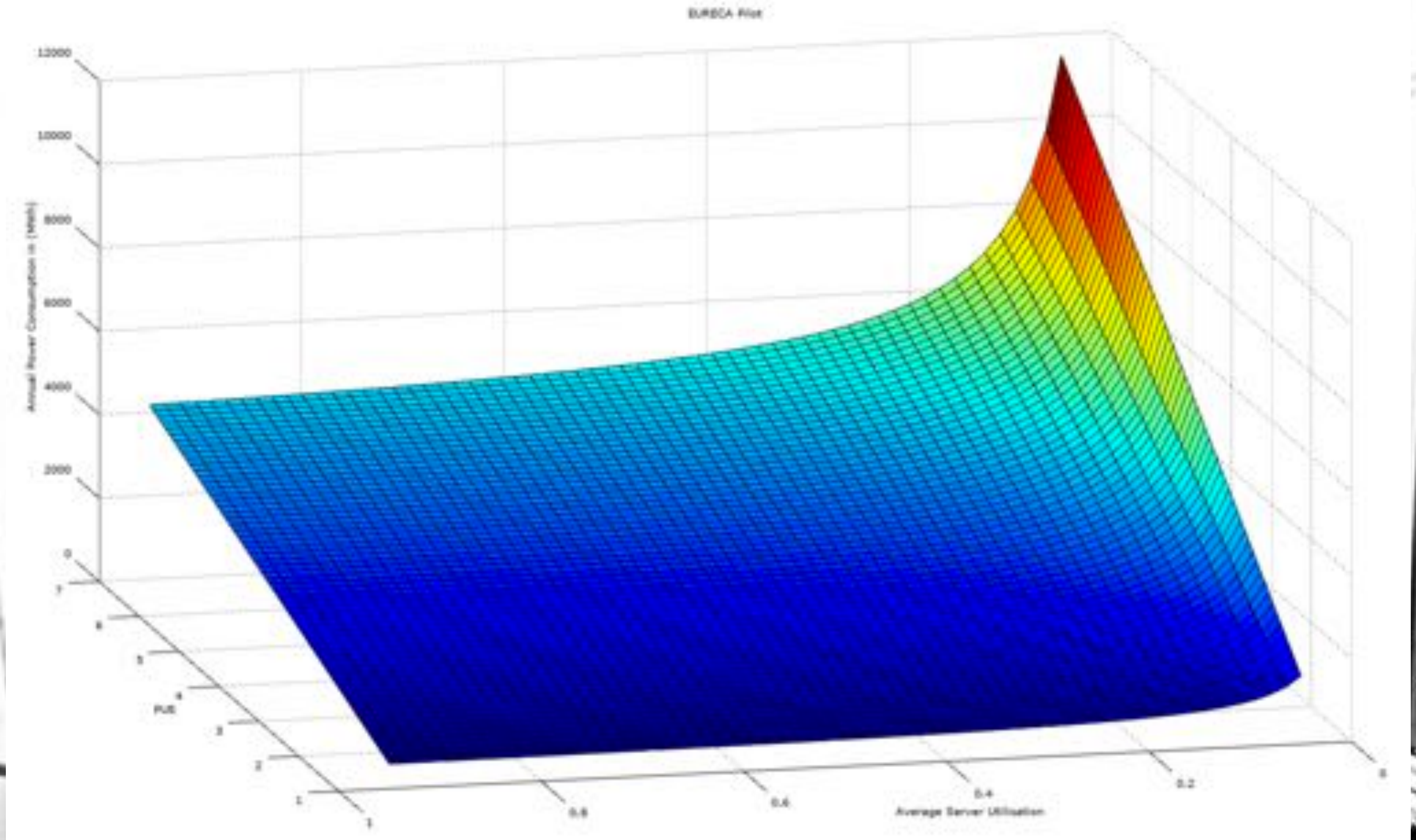




Energy Consumption breakdown by IT Equipment type

€14,000

Server Utilisation

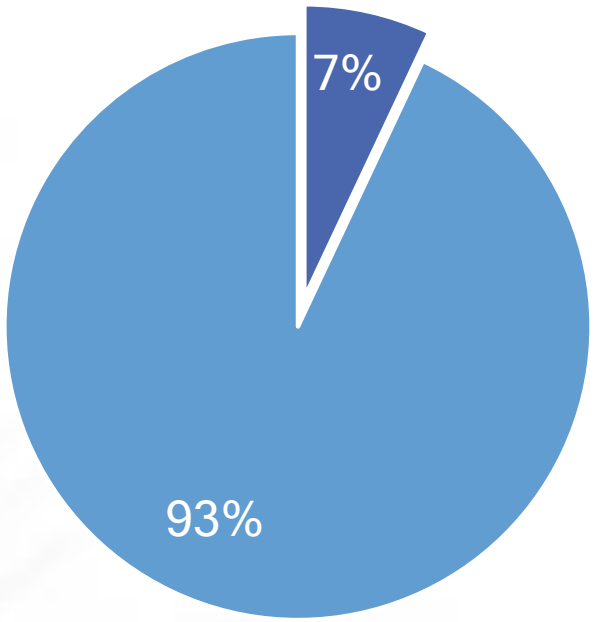

EURECA Plot
Annual Power Consumption in (MWh)
12000
10000
8000
6000
4000
2000
PUE
1
2
3
4
5
6
7
Average Server Utilisation
1
0.8
0.6
0.4
0.2
0

Points affecting server utilisation

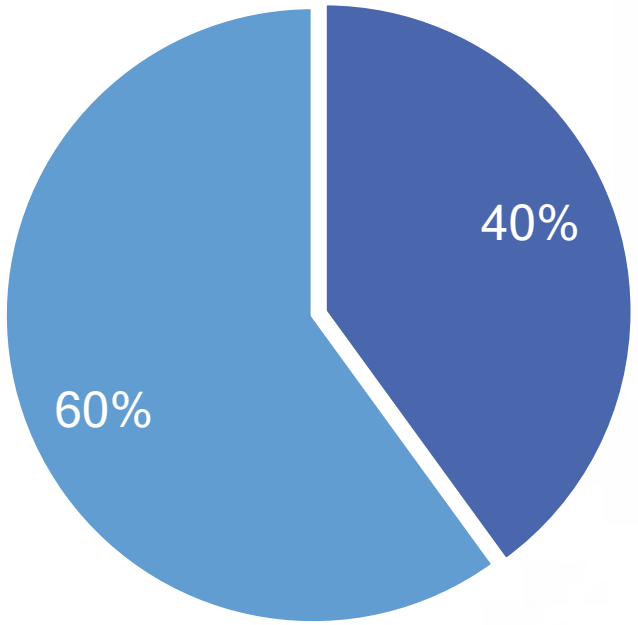
- Active – Active / clustering deployments
- Peak utilisation vs performance degradation
- Ensuring there is enough capacity in the system to cater for workload peaks
- Having the right server configuration for the workload

Server Distribution

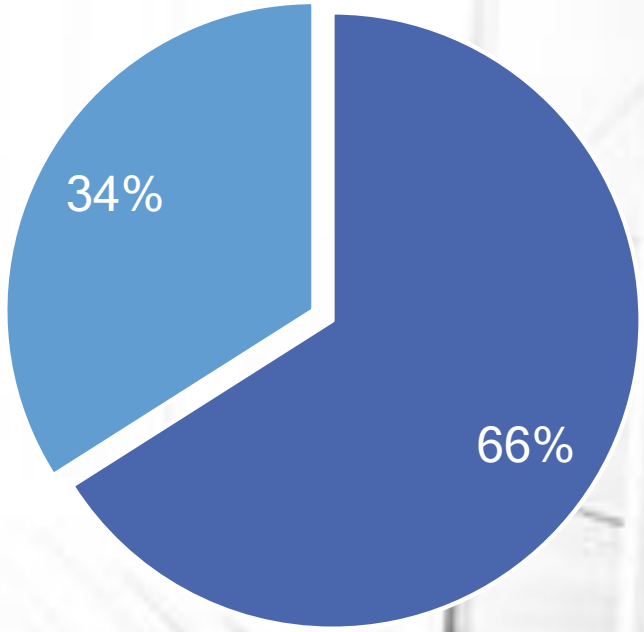
Compute Capacity



Age



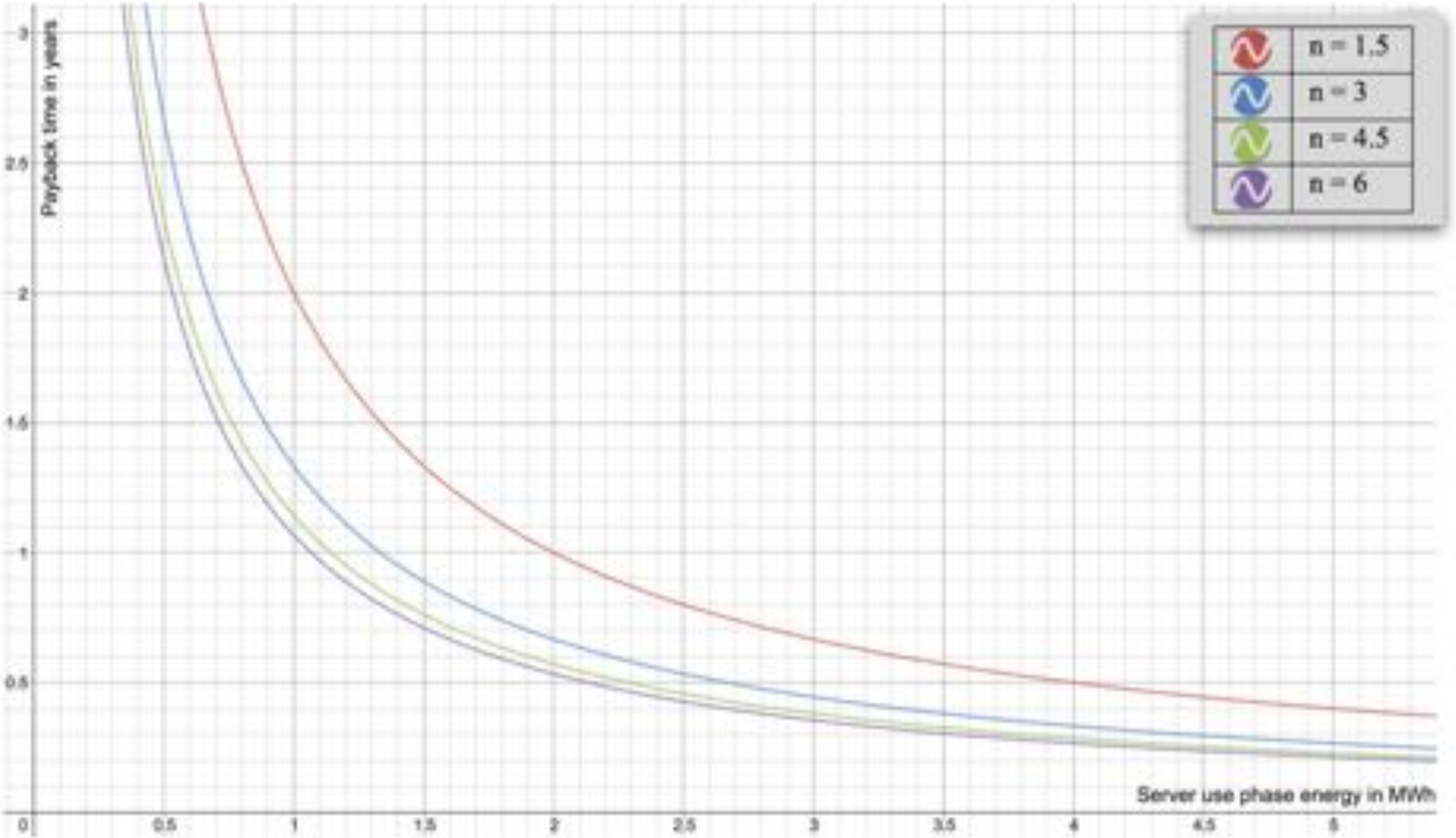
Energy Consumption



> 5 years old

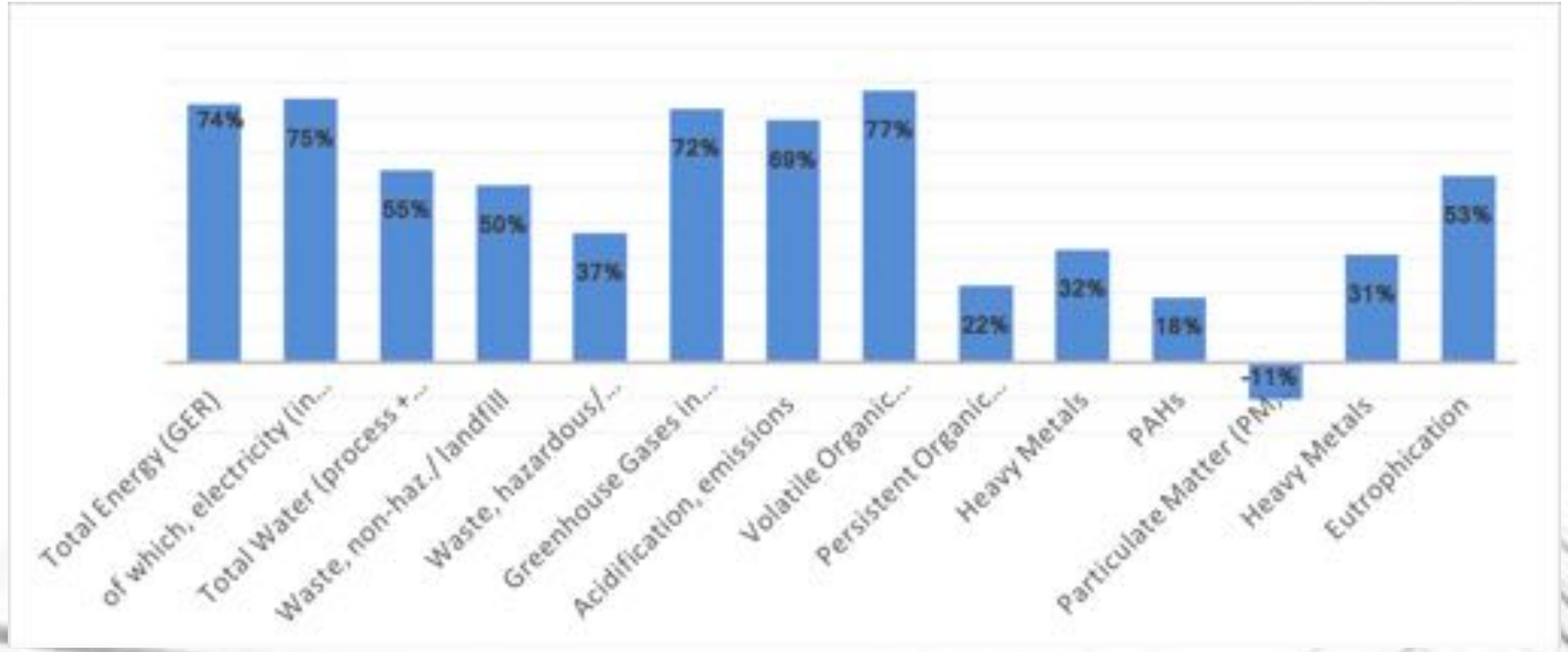
	Scenario	PUE	β	Annual Use Phase Energy in KWh (for running workload ω)					
				Hardware 1 (7.5Y old)	Hardware 2 (6Y old)	Hardware 3 (4.5Y old)	Hardware 4 (3Y old)	Hardware 5 (1.5Y old)	Hardware 6 (Current)*
On-Premise (non-virtualised)	Worst	3	5%	51,372,685	15,414,061	12,840,312	6,257,229	2,453,698	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*


n = 1.5
n = 3
n = 4.5
n = 6
Payback time in years
Server use phase energy in MWh
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

Points affecting hardware refresh

- Budget availability and accounting practices
- Misconception about environmental impact



The major impact areas

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

Training Certificates

1) Register/login: https://www.dceureca.eu
2) Scan code below and request certificate
PS: Ensure you've signed the attendance sheet

https://www.dceureca.eu/?page_id=3055