Supporting sustainable ICT procurement in Public Sector: The EURECA project

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Outline

- Why worry about Sustainability?
- What are the challenges when it comes to public procurement?
- What is EURECA?
- Early Results: Hardware Refresh Rates
- Working together

Why worry about Sustainability?


3%
Of world
Electricity is
used by
Datacenters

80%

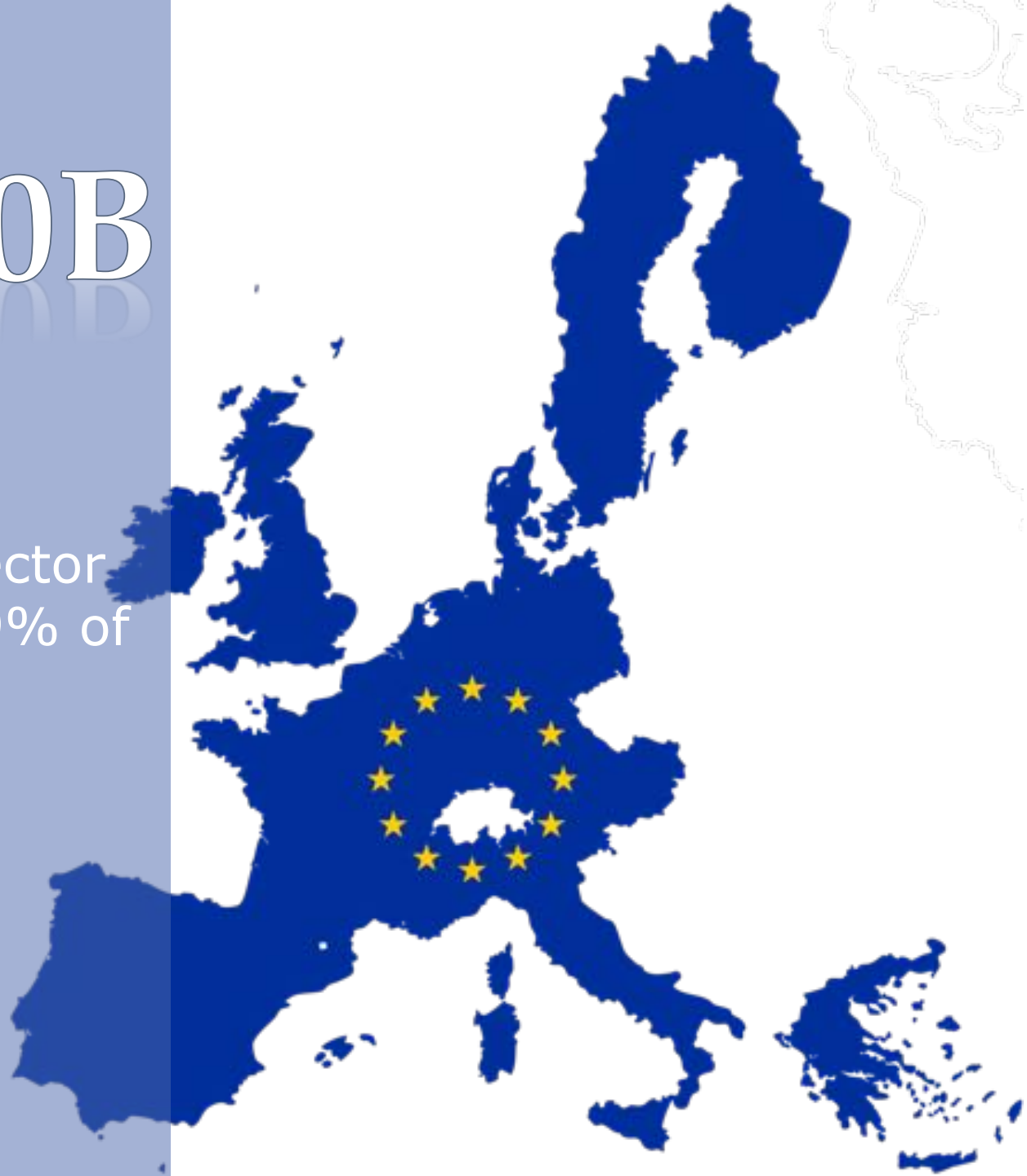
Energy Consumption Reduction by 2050 compared to 1990

£90M

Annual UK Universities ICT Electricity bill 2012 (60% on servers)

€2,200B

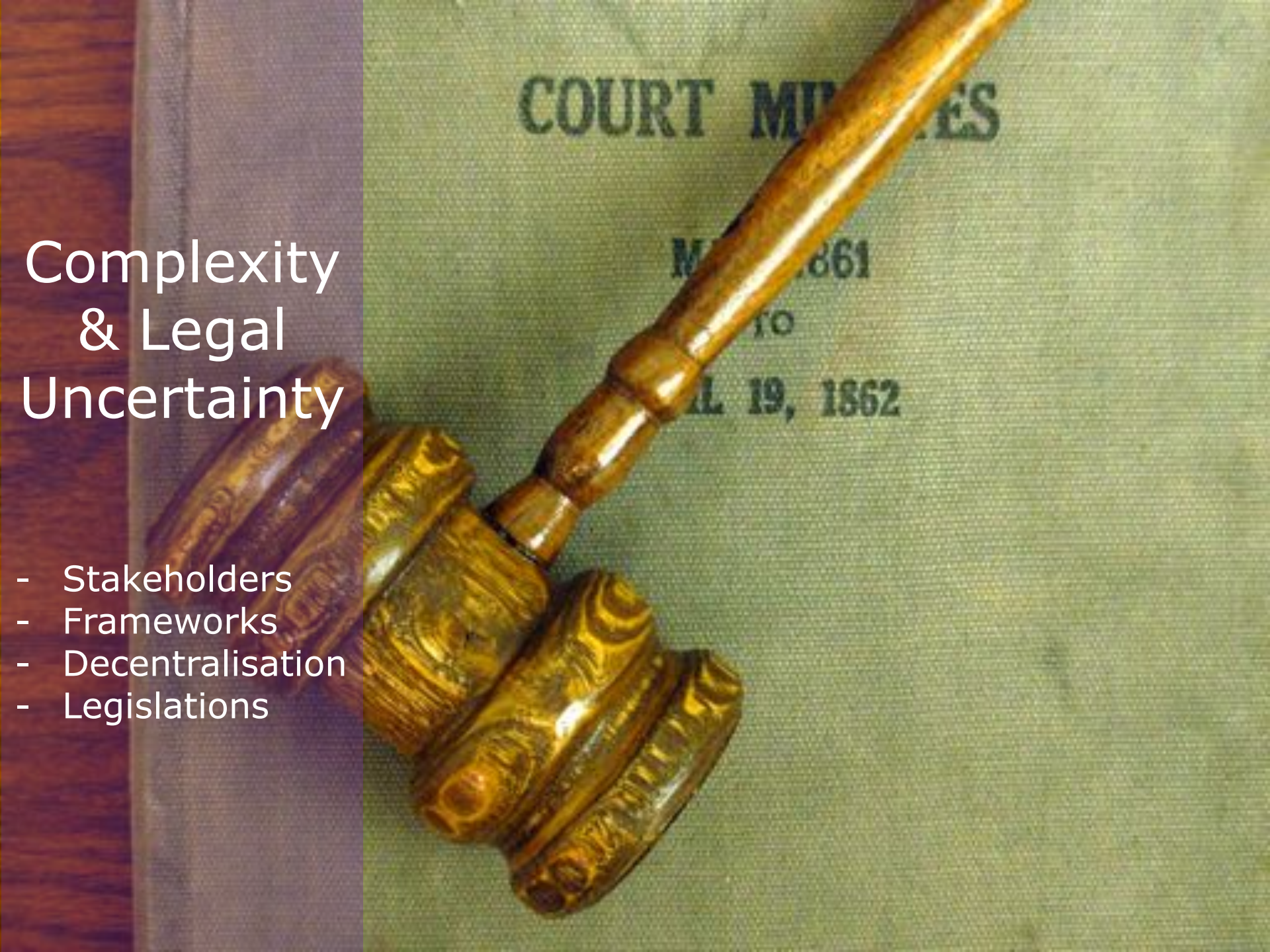
EU Public Sector Spending (19% of GDP)



£0.00

What are the challenges when it comes to public procurement?

Complexity & Legal Uncertainty



- Stakeholders
- Frameworks
- Decentralisation
- Legislations

Insufficient Priority

- Low budget (%)
- Split incentives
- Not Core business

Lack of Technical Expertise

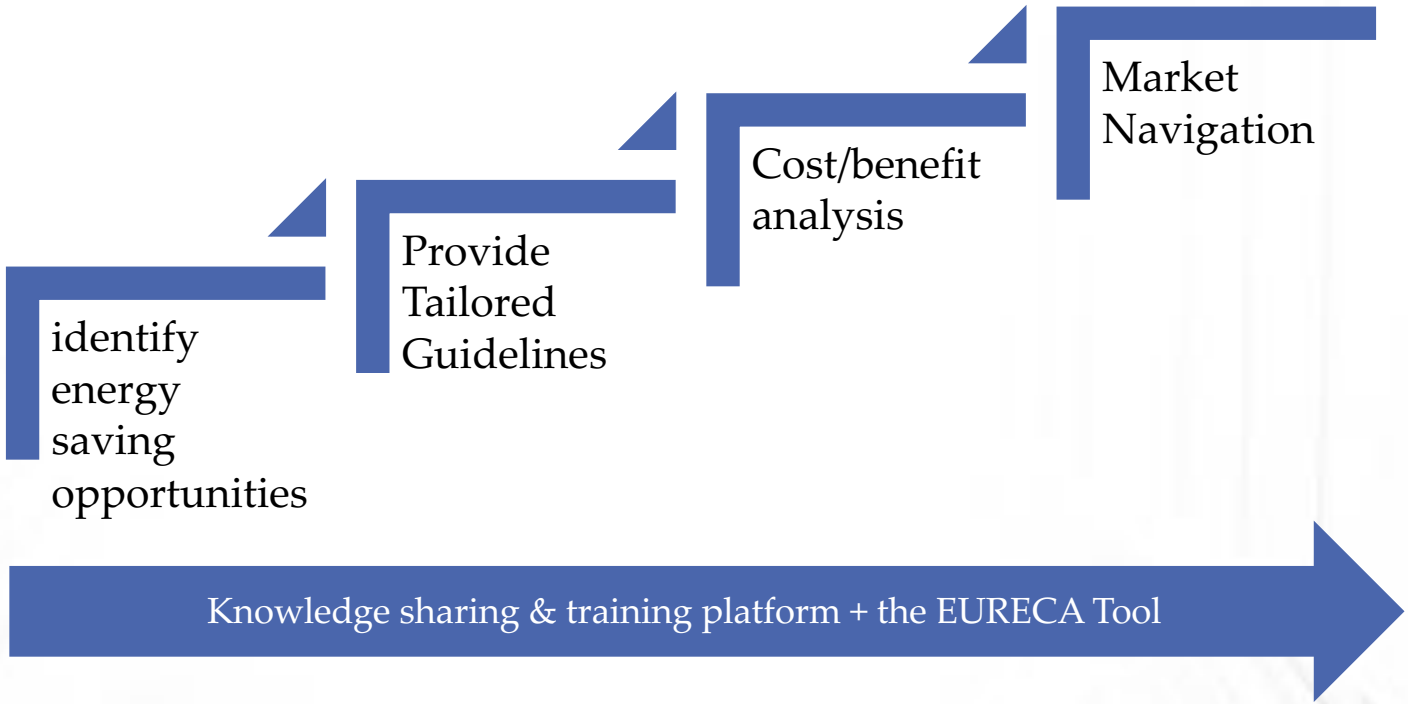
- Standards
- Best practices
- Evaluation of Technologies

What is EURECA?

Project Overview

- Aim: Assist the public sector with the uptake of innovative energy efficient and environmentally sound data centre products and services.
- Project started on 1st March 2015 and will run for 30 months.
- Partners come from three main regions (Germany, Netherlands and UK), with wider EU focus.

Approach


identify energy saving opportunities
Provide Tailored Guidelines
Cost/benefit analysis
Market Navigation
Knowledge sharing & training platform + the EURECA Tool

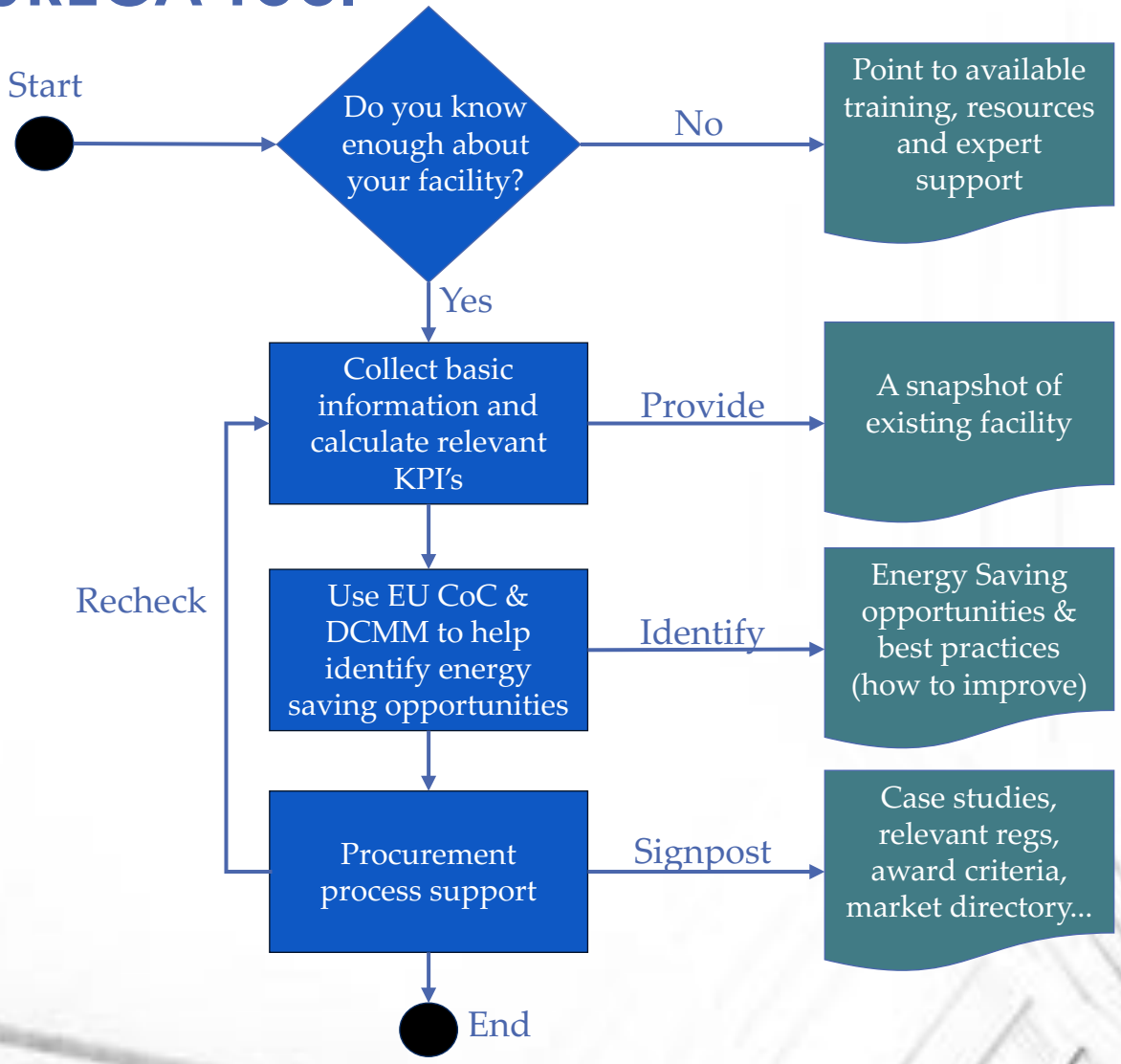
Approach

- **Lack of technical expertise**
  - EURECA Tool, training programmes
- **Complexity and Legal Uncertainty**
  - Templates, case studies, knowledge sharing
- **Insufficient Priority**
  - Awareness and policy recommendations
- **Stakeholder oriented support**
  - Procurers, Decision Makers, ICT Managers, and Policy Makers.

Knowledge Sharing & Training Events

Date	Location
June, 2015	London
November, 2015	Riga
February, 2016	Turin
May, 2016	Dublin
September, 2016	Amsterdam^
November, 2016	Paris^
February, 2017	Stockholm^
May, 2017	Barcelona^
August, 2017	Brussels^

The EURECA Tool



Early Results:
Hardware Refresh Rates

Overview

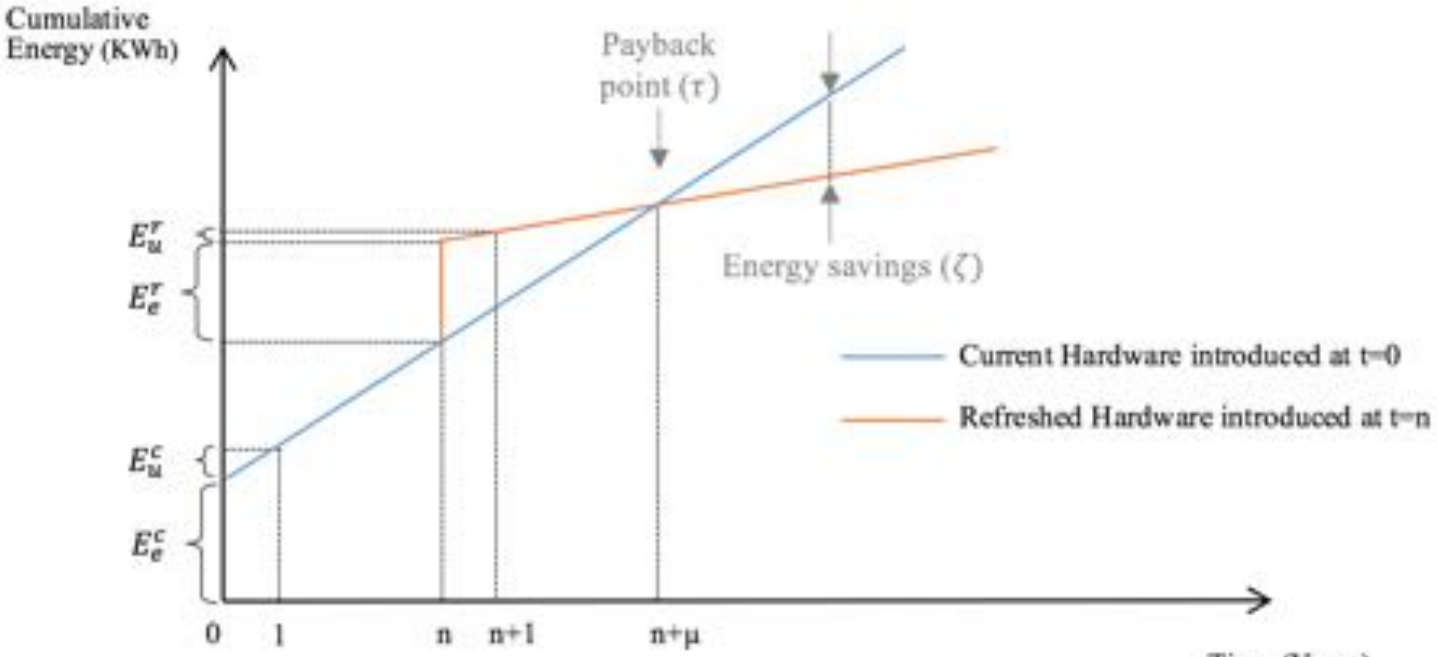


Figure 1. Cumulative energy trends for current hardware vs refreshed hardware

Payback time and Savings

$$\tau = n + \frac{E_e^r}{E_u^c - E_u^r}$$

$$\mu = \frac{E_e^r}{E_u^c - E_u^r}$$

$$\zeta_\sigma = E^r - E^c = (E_u^c - E_u^r)(\sigma - n) - E_e^r$$

Embodied Energy of Enterprise Servers

- Values range between 1MWh and 650KWh
- Value chosen is 1MWh
- Server use phase energy:

$$E_u^s = AE_u^s \times PUE$$

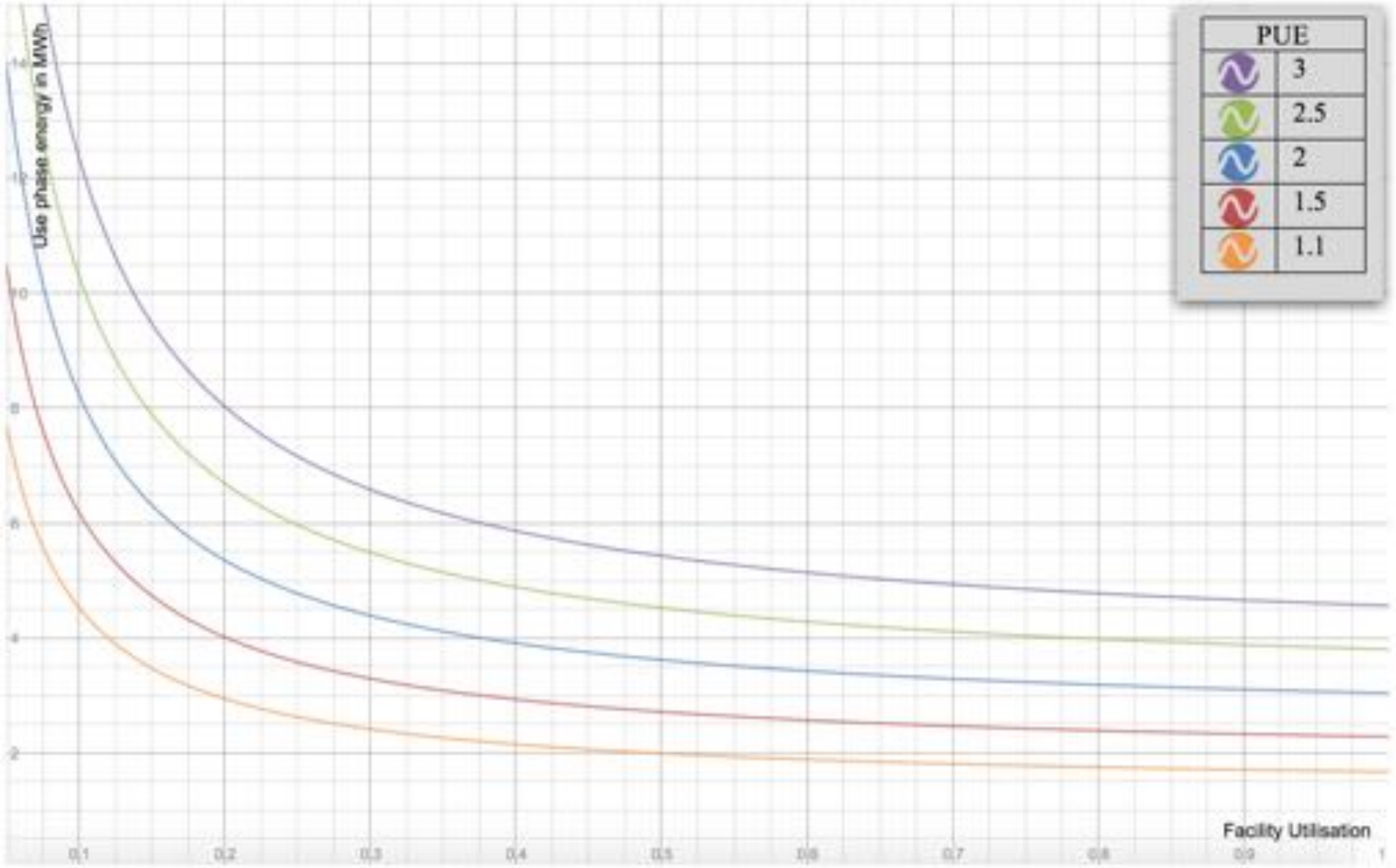
- Workload based analysis

$$AE_u^s = (E_i^s \alpha + E_o^s \beta) \times 8.76$$

$$E_u^\omega = (E_o^\omega + E_i^\omega \frac{\alpha}{\beta}) \times 8.76 \times PUE$$

DATA CENTER eureca PROJECT

European Commission



Technology trends

- Performance improvement of servers over time:

$$E_u^r = \frac{E_u^c}{2^{\left(\frac{n}{1.5}\right)}}$$

- Payback time for a server:

$$\mu = \frac{E_e^r}{E_u^c}\left(1 - \frac{1}{2^{\left(\frac{n}{1.5}\right)}}\right)^{-1}$$

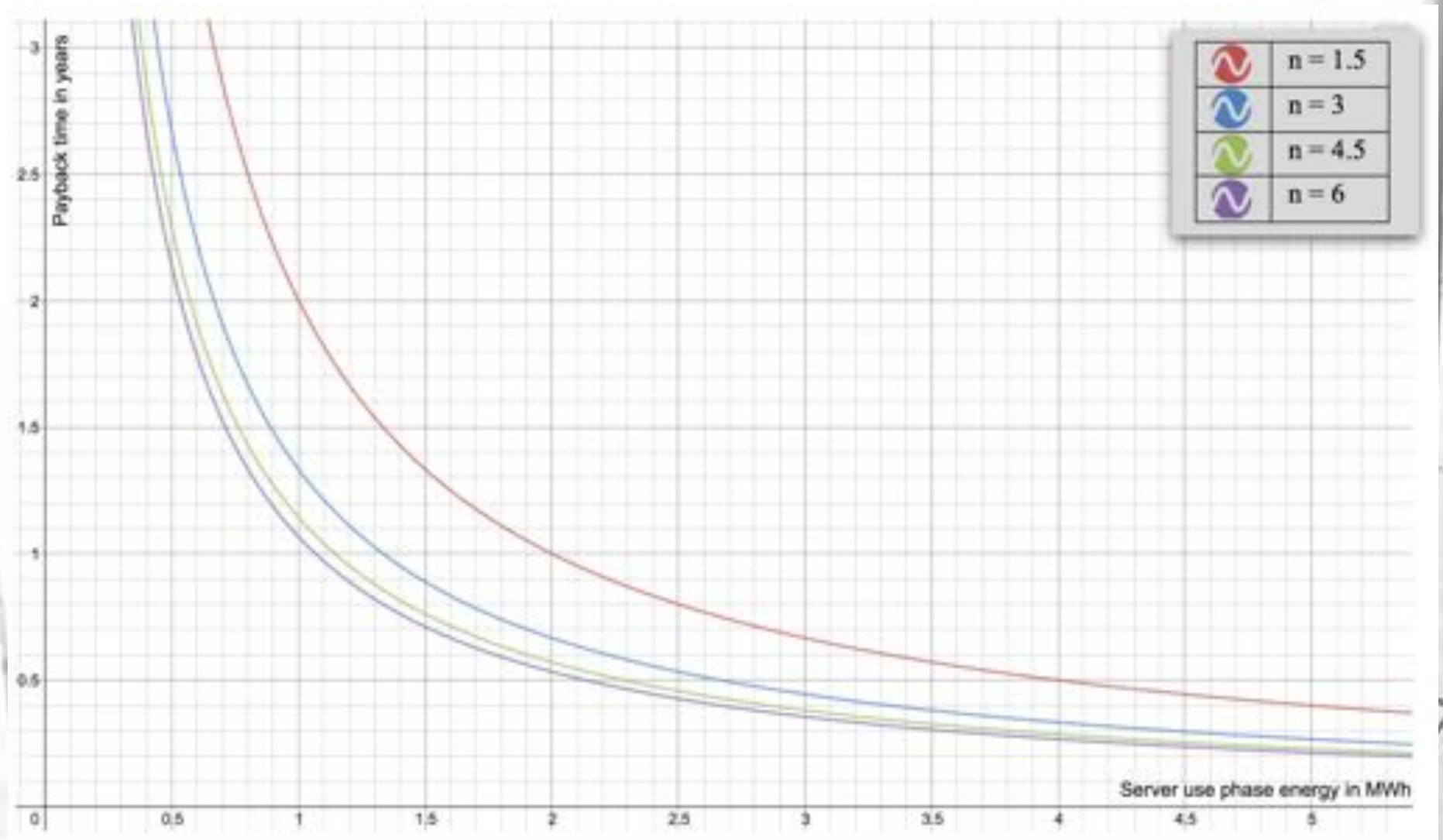

Payback time in years
3
2.5
2
1.5
1
0.5
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Server use phase energy in MWh
n = 1.5
n = 3
n = 4.5
n = 6

Table 4. Annual use phase energy consumption of workload ω for various deployment options using worst, average and best case scenarios for the 6 different hardware profiles.

	Scenario	PUE	β	Annual Use Phase Energy in KWh (for running workload ω)					
				Hardware 1	Hardware 2	Hardware 3	Hardware 4	Hardware 5	Hardware 6
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

Table 5. Annual use phase energy consumption of a server given various deployment options using worst, average and best case scenarios for the 6 different hardware profiles.

	Scenario	PUE	β	Annual Use Phase Energy in KWh (for a server)					
				Hardware 1	Hardware 2	Hardware 3	Hardware 4	Hardware 5	Hardware 6
On-Premise (non-virtualised)	Worst	3	5%	3,777	2,462	3,016	2,194	1,441	1,040
	Average	2	10%	2,604	1,767	2,169	1,653	1,119	815
	Best	1.5	25%	2,146	1,609	1,984	1,667	1,194	885
Colocation (non-virtualised)	Worst	2.5	5%	3,148	2,051	2,514	1,829	1,201	866
	Average	1.8	10%	2,344	1,591	1,953	1,488	1,007	733
	Best	1.3	25%	1,860	1,395	1,719	1,445	1,035	767
On-Premise (virtualised)	Worst	3	6%	3,803	2,500	3,064	2,251	1,489	1,076
	Average	2	30%	2,948	2,272	2,803	2,413	1,750	1,301
	Best	1.5	60%	2,598	2,272	2,816	2,665	2,023	1,523
Private Cloud	Worst	2.5	7%	3,191	2,115	2,593	1,924	1,280	927
	Average	1.8	30%	2,653	2,045	2,523	2,172	1,575	1,171
	Best	1.3	60%	2,251	1,969	2,440	2,310	1,753	1,320
Public Cloud	Worst	2	7%	2,553	1,692	2,074	1,539	1,024	742
	Average	1.5	40%	2,340	1,893	2,340	2,095	1,549	1,158
	Best	1.1	70%	2,000	1,805	2,239	2,164	1,657	1,251

Table 6. Number of servers needed to run workload ω given various deployment scenarios and hardware profiles.

	Scenario	PUE	β	Number of servers needed to run workload ω					
				Hardware 1	Hardware 2	Hardware 3	Hardware 4	Hardware 5	Hardware 6
On-Premise (non-virtualised)	Worst	3	5%	13,601	6,261	4,257	2,852	1,703	2,014
	Average	2	10%	6,800	3,131	2,128	1,426	851	1,007
	Best	1.5	25%	2,720	1,252	851	570	341	403
Colocation (non-virtualised)	Worst	2.5	5%	13,601	6,261	4,257	2,852	1,703	2,014
	Average	1.8	10%	6,800	3,131	2,128	1,426	851	1,007
	Best	1.3	25%	2,720	1,252	851	570	341	403
On-Premise (virtualised)	Worst	3	6%	11,334	5,218	3,547	2,376	1,419	1,678
	Average	2	30%	2,267	1,044	709	475	284	336
	Best	1.5	60%	1,133	522	355	238	142	168
Private Cloud	Worst	2.5	7%	9,715	4,472	3,041	2,037	1,216	1,439
	Average	1.8	30%	2,267	1,044	709	475	284	336
	Best	1.3	60%	1,133	522	355	238	142	168
Public Cloud	Worst	2	7%	9,715	4,472	3,041	2,037	1,216	1,439
	Average	1.5	40%	1,700	783	532	356	213	252
	Best	1.1	70%	971	447	304	204	122	144

Working together

- We are looking for public sector partners to work with us to help prove the concept
- Looking for public sector “champions” in this field
- To drive knowledge sharing and networking
- Help steer and tailor the EURECA tool design and results
- Please register your interest at: www.EURECA-PROJECT.eu