Data centre energy efficiency streamSAVE+, June 2025

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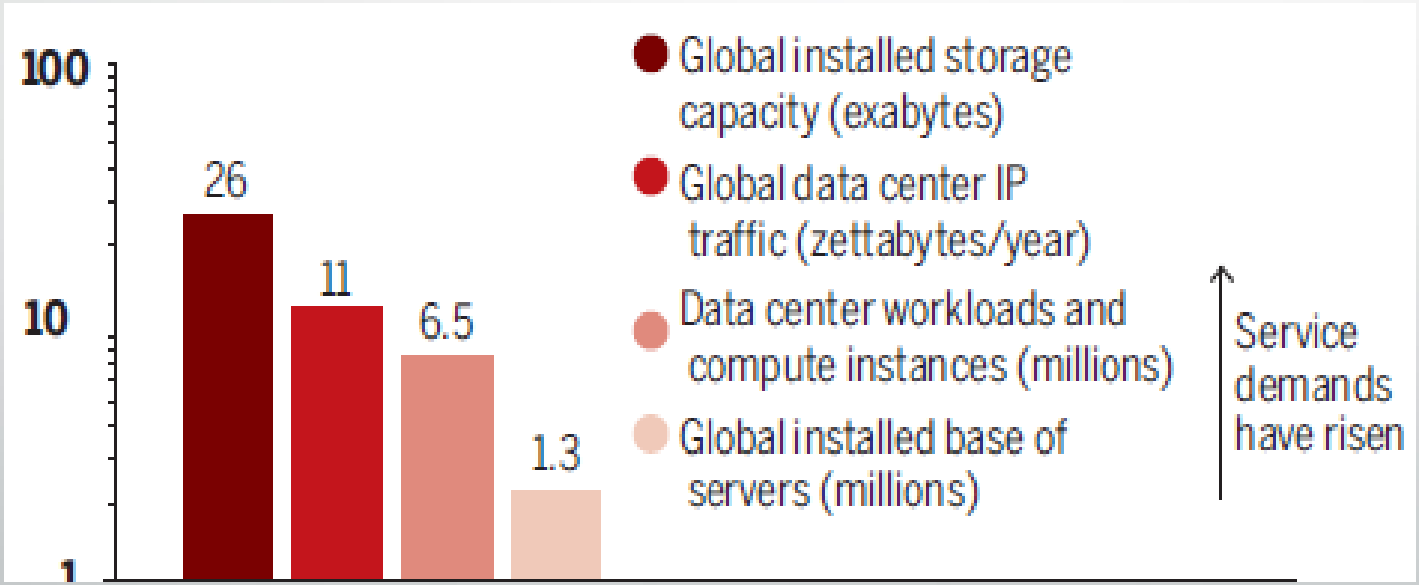
Outline

1. DC energy use - past and projections
2. Ways of improving DC energy efficiency
3. Policies in effect

DC change in demand to 2018

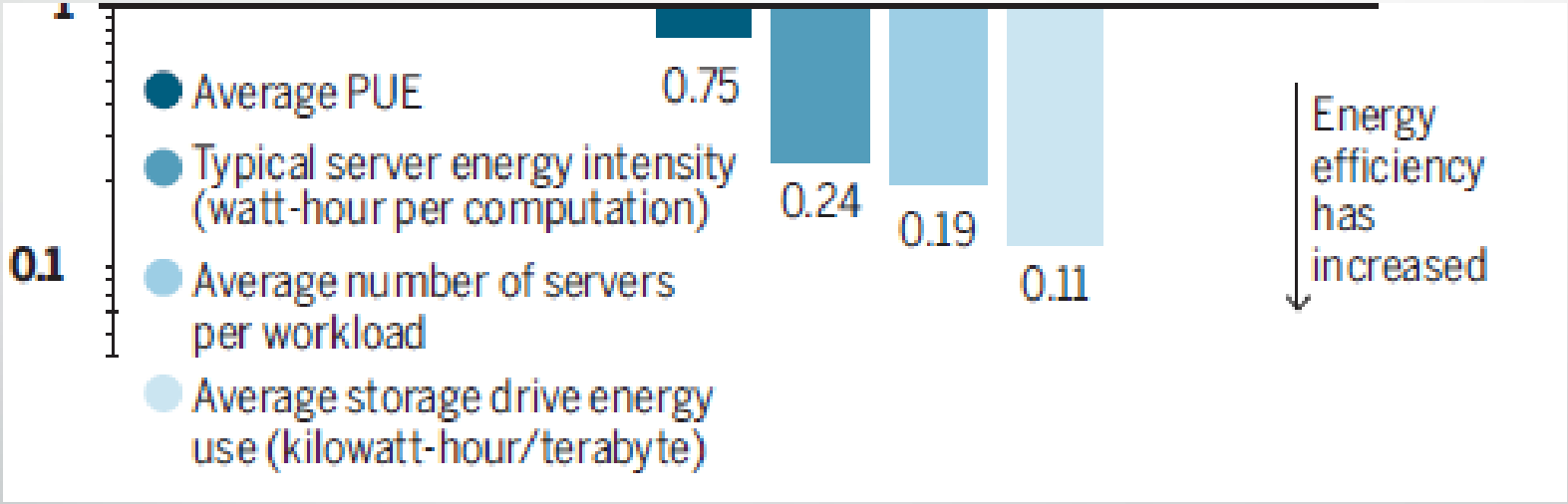
Growth in service demand between 2010 to 2018

(from Masanet et al 2020)



Efficiency gains to 2018

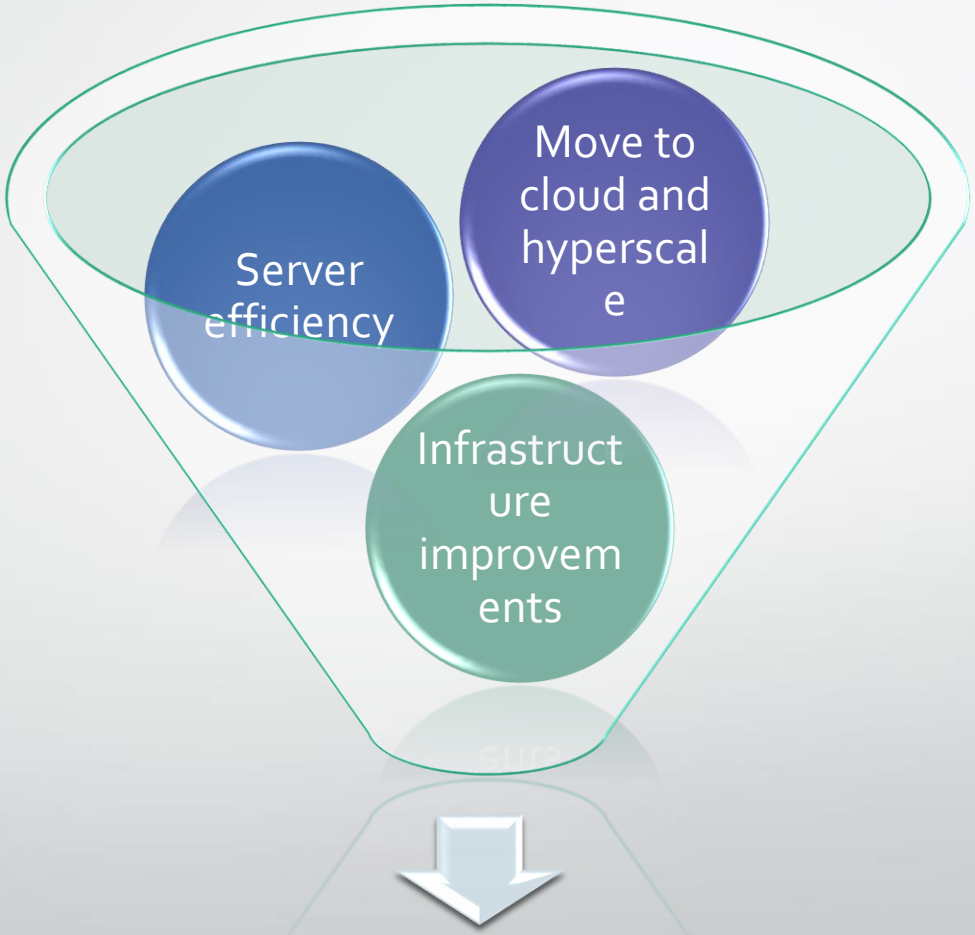
Increase in energy efficiency between 2010 to 2018
(from Masanet et al 2020)



PUE Power Usage Effectiveness

$$PUE = \frac{(IT\ equipment\ energy\ use + infrastructure\ energy\ use)}{IT\ equipment\ energy\ use}$$

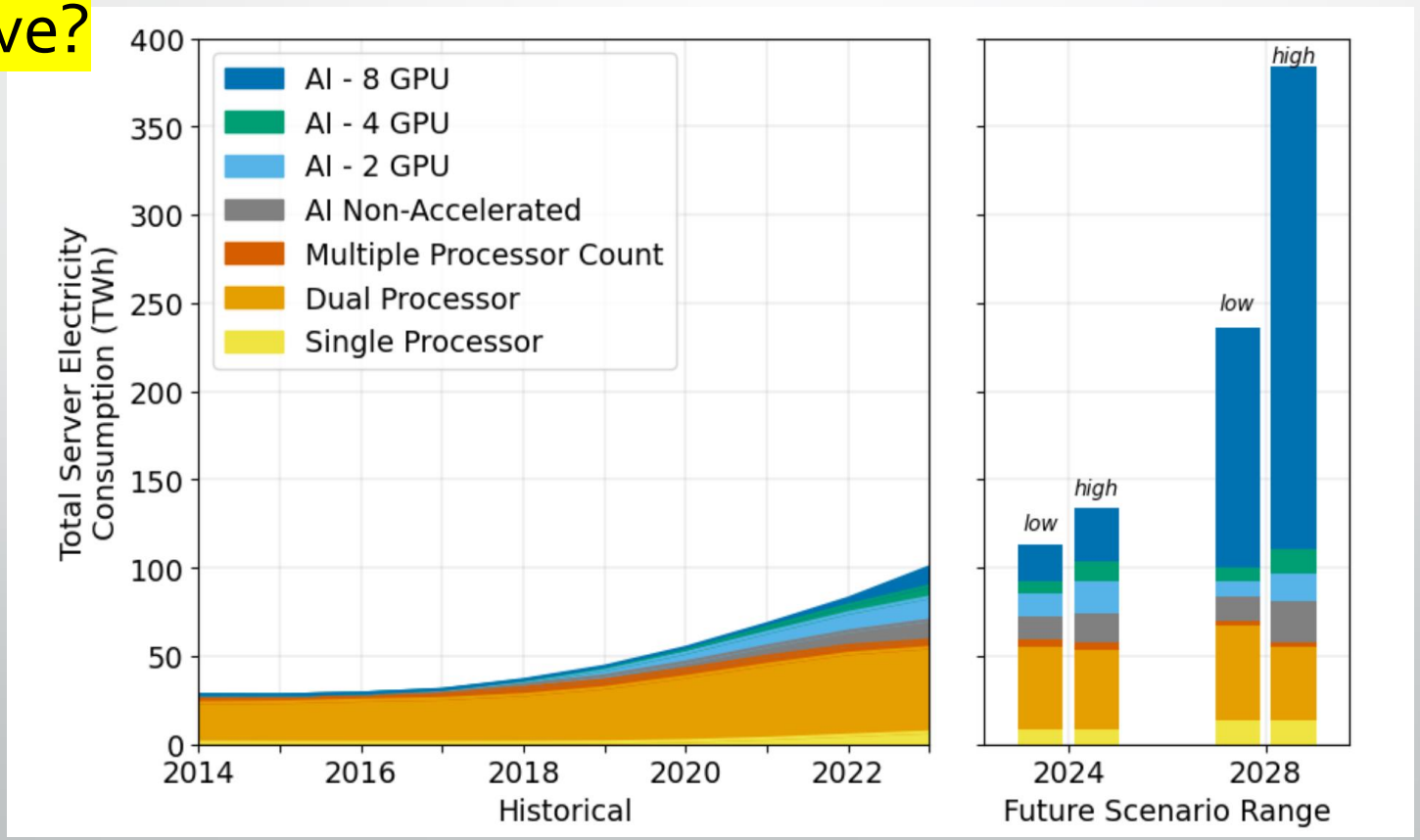
Sources of efficiency gains to date



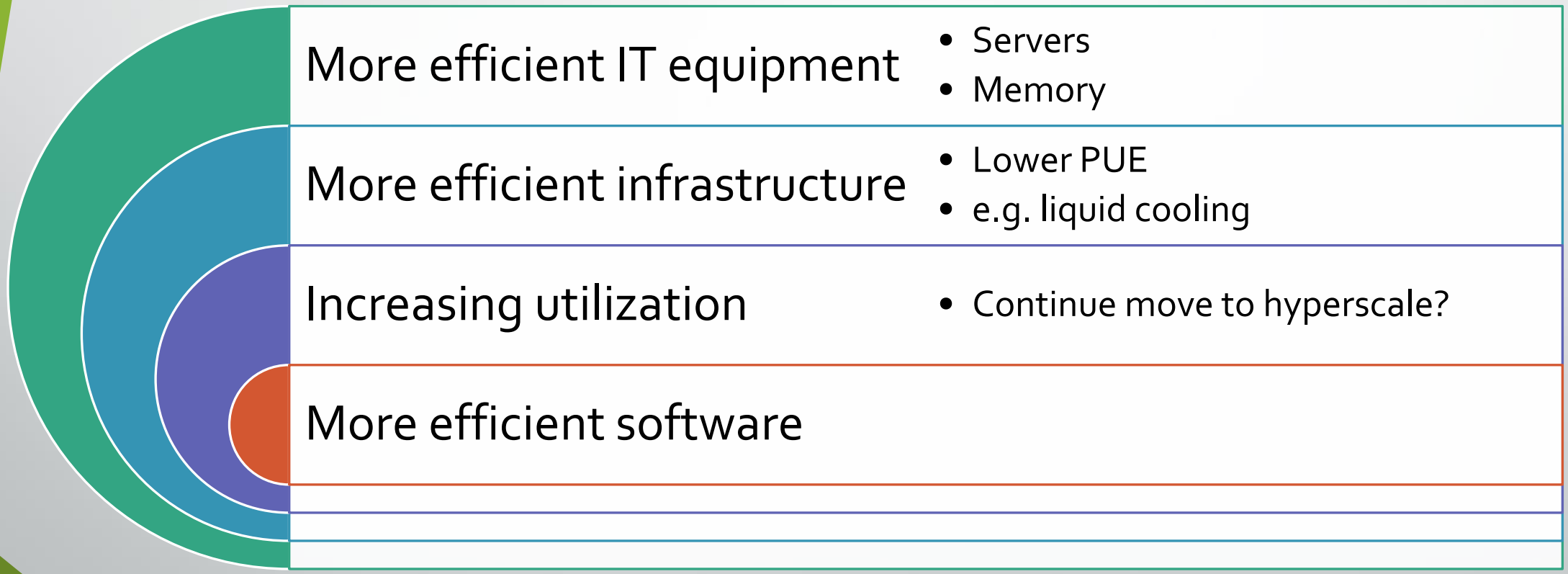
Projected growth in energy demand

USA Server electricity consumption (Shehabi et al 2024)

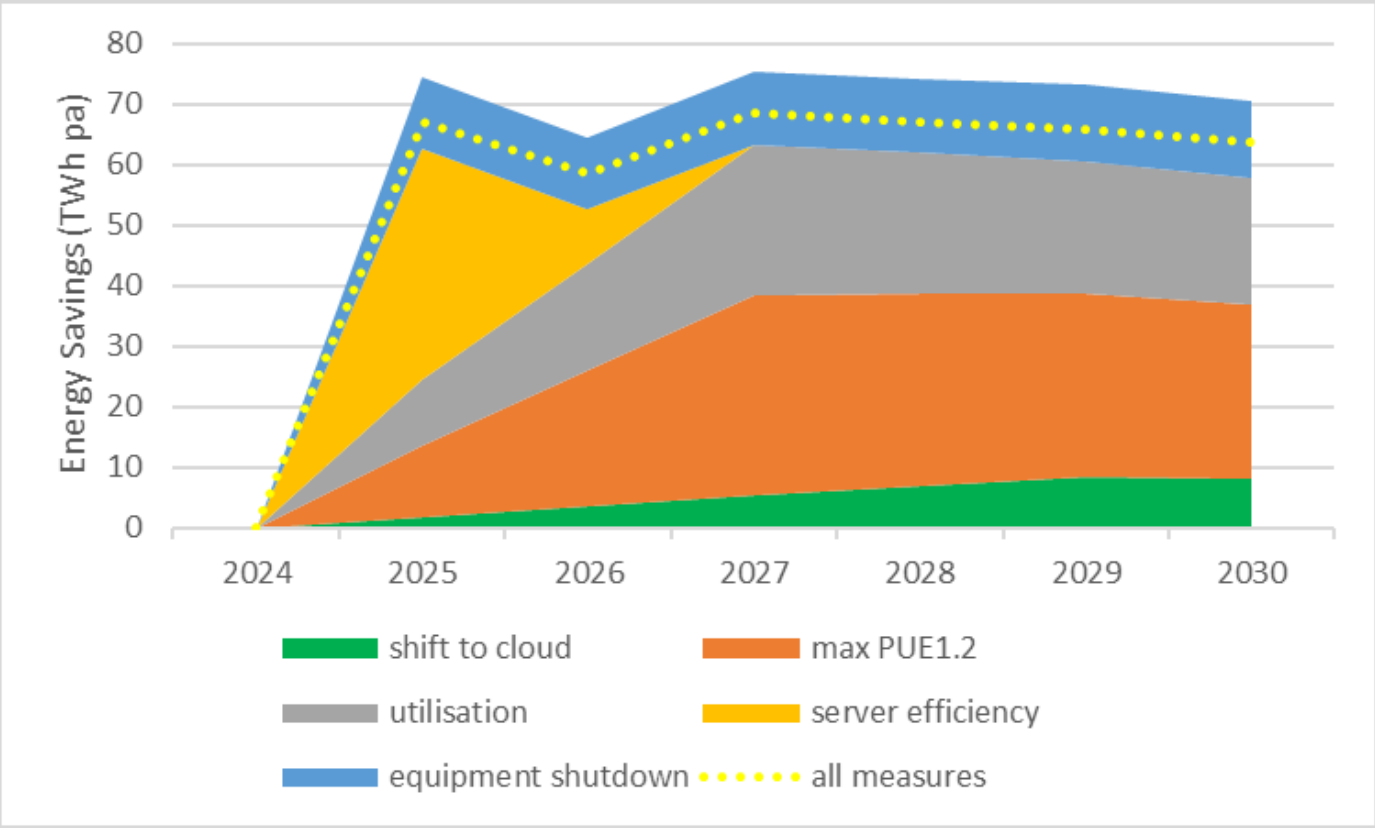
Conservative?



More energy savings through:



Possible energy savings (2024)



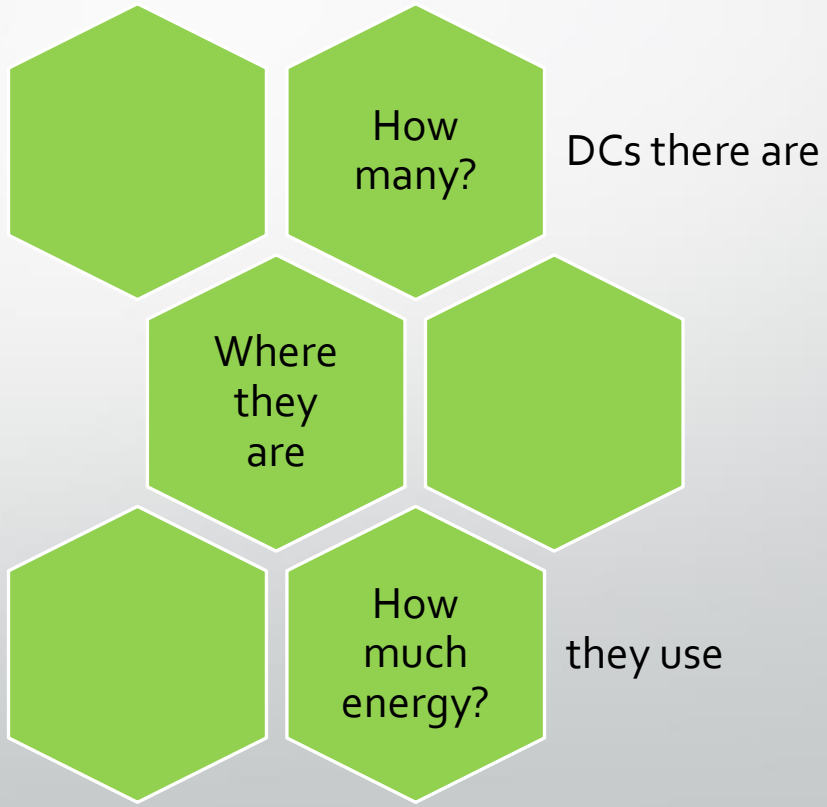
- Previous version of TEM model (no AI)
- Some values arbitrary
- Sparse data

DC reporting policies

To inform development of other policies

DC specific examples in EU and DE

Broader obligations in FR, JP and some US states and cities (separate report on US, 2024)



Policies to improve DC energy efficiency

Examples of each in 2024 report

1. Government permitting 
2. MEPS 
3. Obligations 
4. Cloud first and data centre consolidation 
5. Public sector procurement 
6. Incentives 
7. Voluntary agreements 
8. Labels and certificates 

Separate report just on EE labels. 12 voluntary labels in ‘high DC’ countries. 2024

EU Policies to improve DC energy efficiency

- European Code of Conduct for Energy Efficiency in Data Centres Since 2008. Participants commit to reducing energy use. Best practice guidelines published annually.
- Article 12 of EED (2023) and Delegated Regulation (EU) 2024/1364 (on the first phase of the establishment of a common Union rating scheme for data centres)
  DC > 500kW report energy use and other parameters annually

1) Government permitting

Requirements to build new data centres

China: Three-Year Action Plan on New Data Centres 2021-2023
Minimum PUE and utilisation

Singapore: Pilot Data Centre Call for Applications
Announced July 2022, first awards July 2023
PUE and others

2) MEPS

Data centre specific

China, 2022; Combined with mandatory label (3 levels)
PUE metric

Germany, 2023
PUE metric

3) Obligations

DCs within broader policies

France, ELAN, 2019
PUE

on buildings

Japan, Energy Conservation Act, 2022
PUE

on organisations

Netherlands,
Energy Saving Obligation, 2019
Adopt energy saving measures

on organisations

4) Government cloud first and data centre consolidation


Canada


France


Singapore


UK


US (Federal)

US (California)

Benefits of cloud vs traditional enterprise:

- Lower PUE
- Greater server efficiency
- Higher utilisation

} resulting in higher energy efficiency

Other advantages: lower upfront investment, flexibility, greater security

Similar benefits from data centre consolidation.

5) Public sector procurement

New South Wales (Australia) Resource Efficiency Policy 2019

Mandatory

EU Green Public Procurement Guidelines 2020

Voluntary

German Resource Efficiency Programme III 2020

Voluntary

Netherlands Sustainable Public Procurement guidance for Networks, Telephone Services and Telephone Equipment

Voluntary

California Green Building Action Plan (data centers) 2014

Mandatory

6) Incentives

EU Corporate Sustainability Reporting Directive 2023
More sustainable businesses are expected
to more attractive to investors

Large companies have to declare which of their businesses are sustainable → Using the EU taxonomy → Data centres meeting CoC are classified as sustainable

CODE OF CONDUCT DATA CENTRES

French finance law article 167 and REEN 2021
Numerous parameters – possibly EU CoC?

UK Climate Change Agreement 2013 (colos only)

% reduction on PUE

7) Voluntary agreements

EU Climate Neutral Data Center Pact 2023
PUE
(certification to this also acts as a voluntary label)

8) Voluntary labels and certification schemes used by other policies

Australia
Infrastructure rating based on PUE

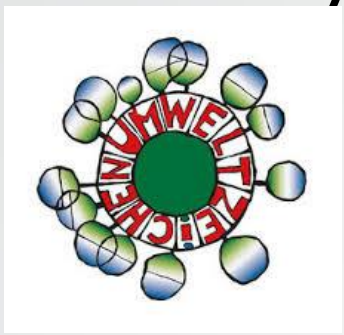
EU
Certification as well as participation
Many parameters including PUE

Germany
Many parameters including PUE and server utilisation.
(Austrian Ecolabel very similar.)

Singapore
4 ratings levels (basic to platinum)
Many parameters including PUE

Other voluntary DC labels

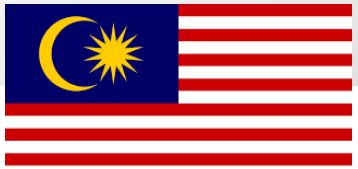
Austria: Ecolabel



Hong Kong: BEAM Plus

International: CEEDA

Korea: Green Data Center



Malaysia: Green Building Index

Swiss: Datacenter Efficiency Association

US: ENERGY STAR

China: Data Center Green Rating Assessment