ENERGY - EFFICIENT DATA CENTRES
Factsheet

2,724 TWh

2024 EU TOTAL ELECTRICITY DEMAND
including industry, transportation, households, etc

3%

CONSUMED BY DATA CENTRES
projected to further increase driven by AI and cloud computing

EU GREEN DEAL

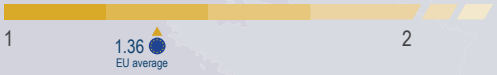
With the 'Green Deal', the EU is commited to **achieve climate neutrality by 2050.**

The increasing electricity demand of data centres makes **sustainable digital infrastructures** a strategic EU priority.

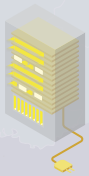
Sustainability goes beyond energy efficiency: energy origin, water usage and energy reuse must also be considered and carefully balanced.

HOW ARE THE ENERGY EFFICENCY AND SUSTAINABILITY OF DATA CENTRES MEASURED?

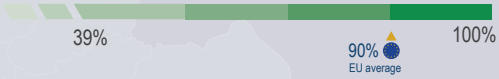
PUE
POWER USAGE EFFECTIVENESS



- Measures the **ratio of infrastructure total energy consumption to its IT energy consumption** (lower is better)
- Most widely used energy efficiency KPI for data centres



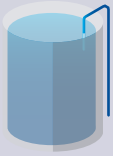
REF
RENEWABLE ENERGY FACTOR



- Measures the **share of renewable energy used** (higher is better)
- High REF implies a cleaner power mix regardless of its usage effectiveness

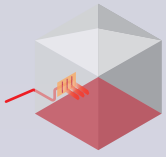
WUE
WATER USAGE EFFECTIVENESS

- Measures **cooling-related water use** m^3/MWh (lower is better)
- Liquid-based cooling can improve a data centre's PUE, and also its water consumption (especially in cold-loop cooling systems)



ERF
ENERGY REUSE FACTOR

- Measures **waste heat (energy) reuse** (higher is better)
- Most data centres still score near zero



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HOW TO IMPROVE THE SUSTAINABILITY OF DATA CENTRES?

1 TECHNOLOGY INNOVATION

New technological advancements are expected to deliver significant gains in energy efficiency in the upcoming years:

- **AI** enables real-time energy usage monitoring and optimisation
- The use of **HVDC (High-Voltage Direct Current)** reduces conversion losses by eliminating the need for AC-to-DC (alternate-to-direct current) coversion
- New **lithium-iron phosphate (LFP) batteries** used in UPS (uninterruptible power supply) systems offer longer lifespan and lower maintaince needs than currently employed lead-acid ones
- **Fuel cells** provide a lower-carbon alternative to conventional diesel generators, serving both as backup and even primary power source

2 SUSTAINABLE CULTURE

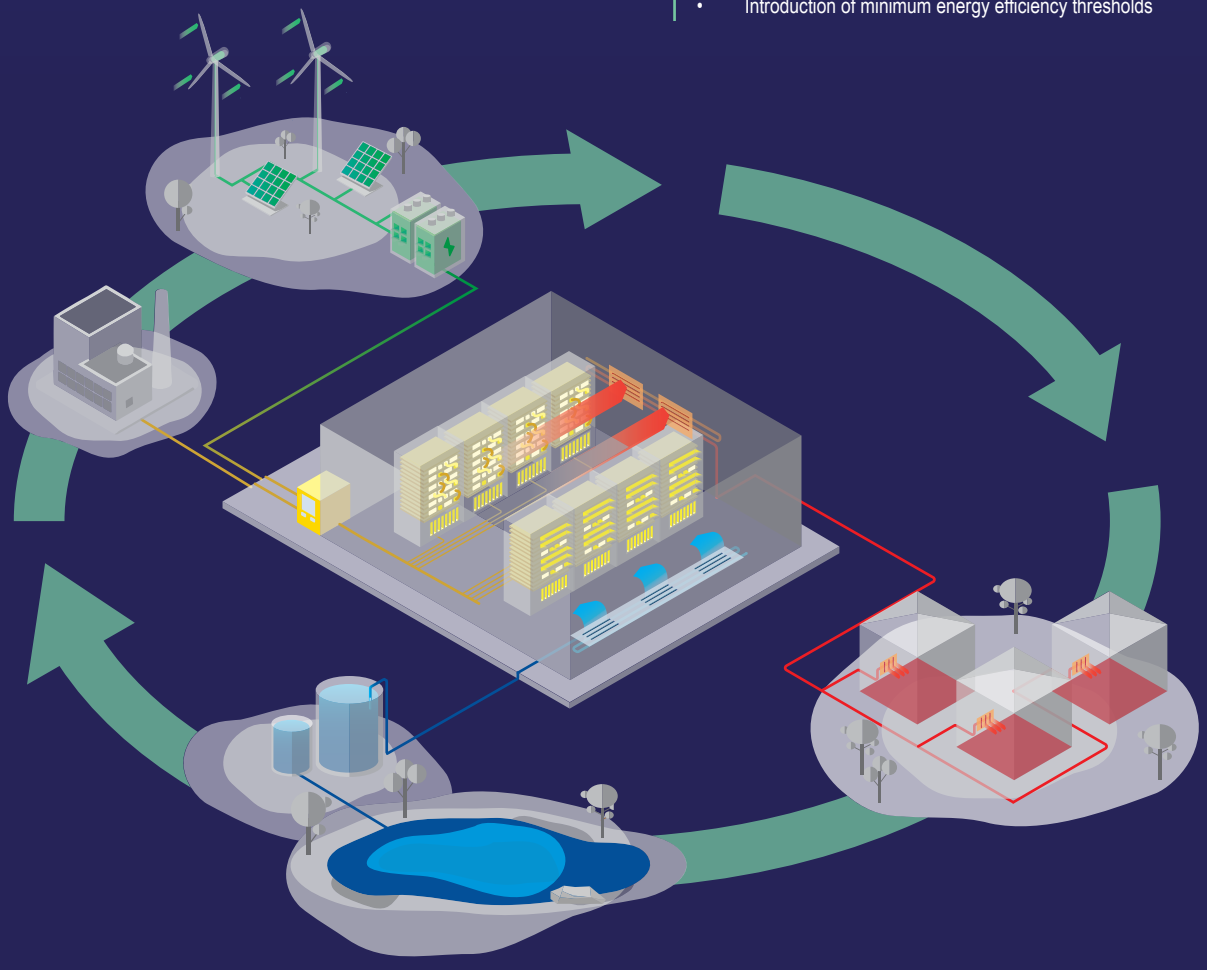
Isolated optimisations, such as improving server efficiency or cooling systems alone, are insufficient. **Technologies can only maximise their potential when integrated into coherent operational strategies and governance frameworks**

Achieving meaningful improvements in energy efficiency requires a **strategic and cultural shift from component-level optimisation to lifecycle-oriented and data-driven management models**

3 REGULATION

EU policies (e.g. Green Deal, Energy Efficency Directive) accelerate the **transition from voluntary best practices to mandatory reporting of sustainability performance,** leading to:

- Better, more consistent benchmarking
- Increased transparency
- Introduction of performance rating schemes
- Introduction of minimum energy efficiency thresholds



To the full report:

ISBN 978-92-95237-21-6 ISSN 2467-0774 doi:10.2857/1630708
Catalogue number: EL-01-26-012-EN-N

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