Data Centres & the Grid Greening ICT in Europe

Report Presentation

Catherine Banet

Ass. Prof, University of Oslo, CERRE Academic Research Fellow

&

cerre

Michael Pollitt Prof, University of Cambridge, CERRE Academic Co-Director

Centre on Regulation in Europe Improving network and digital industries regulation





CONTENTS



Objectives Of The Report



Understanding DC Energy Consumption And Carbon Footprint



Role of DCs in the energy system under EU law



DC investment in a net zerocommitted Europe



Regulatory Issues And Proposals



Conclusions

Objectives Of The Report



OBJECTIVES OF THE REPORT

Provide regulatory/policy recommendations to frame the evolution of data centres (DCs)

Discuss legal status of DCs with respect to energy consumption



Explain what net zero energy policies imply for DCs and energyintensive industries Understanding DC Energy Consumption And Carbon Footprint

UNDERSTANDING DC ENERGY CONSUMPTION AND CARBON FOOTPRINT

DC carbon footprint

- Estimated 2.7% of Europe's electricity consumption in 2018 (3.2% in 2020)
- Drivers: traffic, computation, storage and infrastructure considerations
- Efficiency improvements have limited demand growth, but may be slowing down

Measuring & accounting for Data Centres energy efficiency gains

- Power Utilisation Effectiveness (PUE) vs. other potential metrics such as DCeP (Data Centre Energy Productivity)
- Potential contributions to flexibility via UPS (Uninterruptible power supply) and on-site backup generation?
- Ongoing transformations: hyperscale, cloud, PPAs, net zero commitments

cerre

Underlying drivers of DC energy consumption under-reported and poorly understood

cerre



Source: Adapted from Koot and Wijnhoven (2021) and Masanet et al. (2020) ERP = Enterprise Resource Planning; PUE = Power Usage Effectiveness Role Of DCs In The Energy System Under EU Law

3

ROLE OF DCs IN THE ENERGY SYSTEM UNDER EU LAW

cerre

Definition of DCs under EU legislation

- Available JRC definition
- Necessary harmonisation of DC qualification under EU law.

Qualification of DCs among energy installations

• "Critical infrastructure" label = not necessarily the preferred approach

DC interaction with other actors within energy system

 Various roles: large energy users, grid users, grid operators, electricity/heat producers

DC Investment In A Net Zero-committed Europe

DC INVESTMENT IN A NET ZERO-COMMITTED EUROPE



DCs in the EU

- Limited density of hyperscale DCs vs other regions Northern and Western European focus
- Still potential for energy efficiency savings at aggregate level of move to hyperscale

EU Attractiveness for DC investments

- Comparing EU cities based on key indicators
- Ireland and Denmark case studies adaption of DC clusters to net zero

Implications of EU net zero energy policy on future of DCs

- Rising electricity prices and local grid connection costs at congested locations
- All new large conventional loads in a net zero world will impose high system marginal costs
- o DCs that can provide flexibility will have relatively lower costs

Attractiveness of different European cities for DC investment – Not just about energy



Projected DC demand growth in Ireland



Source: EirGrid-SONI, 2021, p. 24.

Regulatory Issues And Proposals

5

REGULATORY ISSUES AND PROPOSALS (1)



Dynamic regulatory approach based on mix of binding/non-binding instruments

Prioritise harmonisation of common definitions, obligations and operating rules

Carefully assess extended scope of application proposed under revision of NIS Directive and relationship to European Critical Infrastructure Directive.



Further integrate DCs into high-level energy planning processes

REGULATORY ISSUES AND PROPOSALS (2)



Ecodesign Directive provides legal basis for further regulation of energy consumption by DCs

Streamlining the different initiatives and certification schemes

Implementation of E1st principle into legal provisions (EED)



Public administration to make use of greener DC tech



Specific regime for connection to the grid?



CONCLUSIONS

cerre

Unclear whether there is an issue with DC energy demand across Europe – emerging issues around specific cities

Publicly available data is insufficient. Better metrics of energy performance and underlying drivers of energy consumption need to be in more widespread use

Opportunity for industry to lead:

- Associations and standard setting bodies can promote best practice. JRC Code of Conduct on DC Energy Efficiency and Climate Neutral Data Centre Pact welcome
- Industry actors need to make more information publicly available
- Can go further in ensuring that large DCs can contribute to system-wide decarbonisation
- Climate neutrality requires flexibility of energy demand at both local and market levels
- Little reason to <u>negatively</u> single DCs out in EU law given their need to have UPS and opportunities for back-up generation
- However all new large loads may need to face improved locational incentives, requirements for UPS, back-up and contributions to grid flexibility



A CERRE REPORT AUTHORED BY



Catherine Banet

Academic Research Fellow, CERRE Associate Professor, University of Oslo, Faculty of Law, Norway



Michael Pollitt

Academic Co-Director, CERRE Professor, University of Cambridge, UK

Read the full report: <u>https://bit.ly/3Aul9HL</u>