Powering the Cloud: Economics of Ireland's data centres

A mini case study that explores the impact of Data centres on Electricity, Carbon emissions and Employment .

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Electricity, Carbon, and Employment

Exploring the Economic as well as environmental impact of Data centres in Ireland is a comprehensive and extensive undertaking and hence this analysis is limited to the following three parameters :

Electricity

Electricity Consumption

- *How much electricity do data centres consume ?*
- *What are the trends in the consumption ?*

Carbon intensity

Data centre-related emissions

- *How do data centres contribute to the Carbon emissions ?*
- *Quantifying data centre carbon emissions in Ireland*

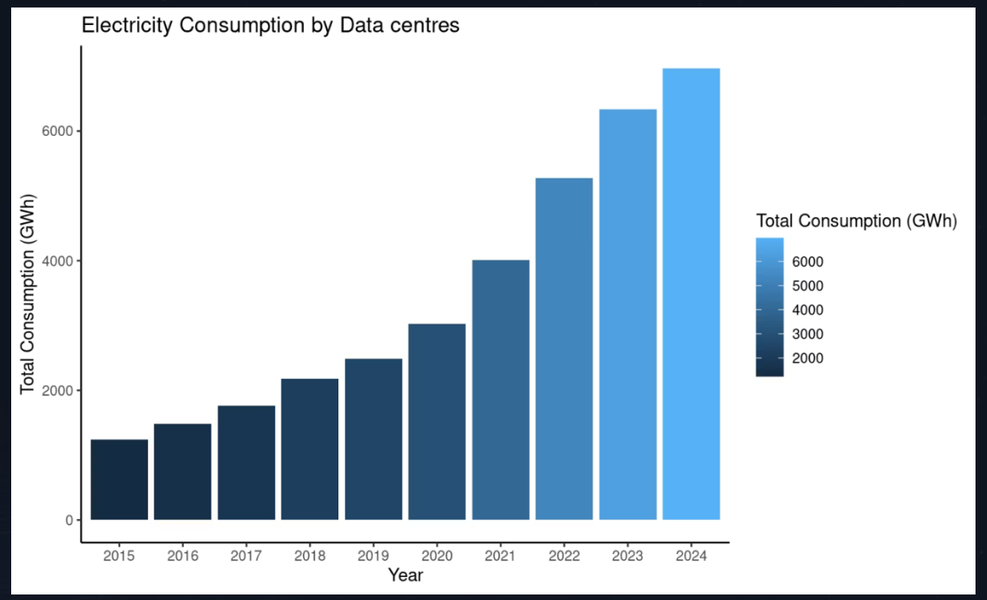
Economic impact

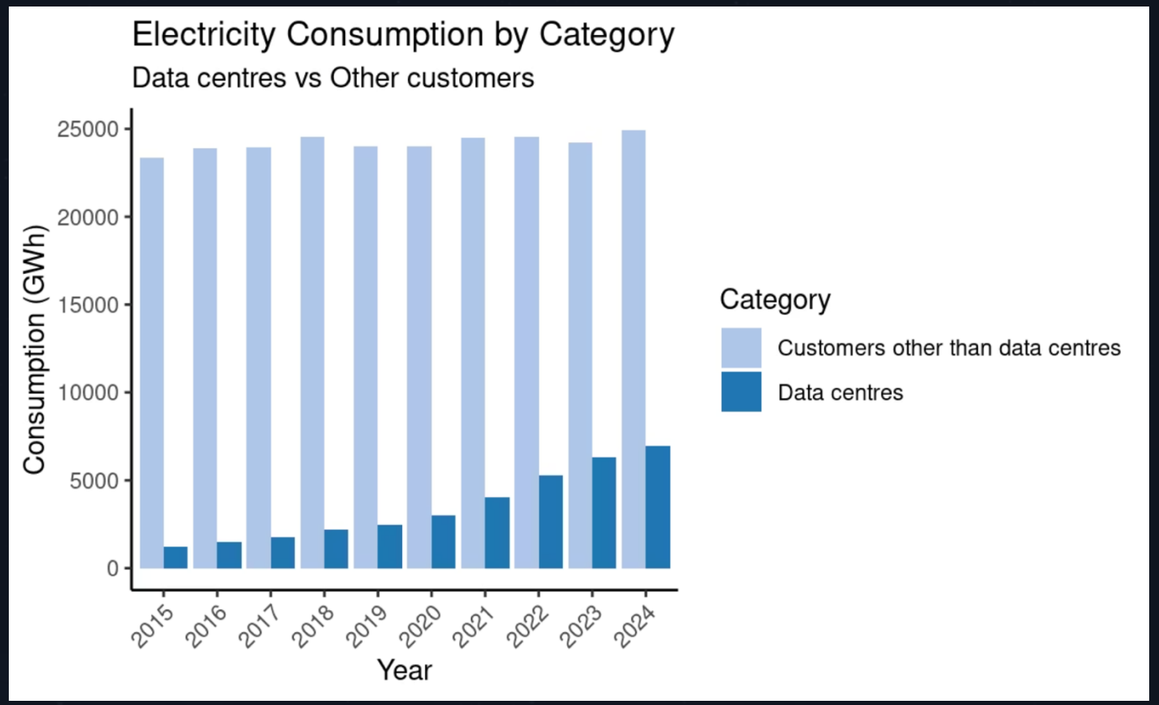
Economic Contributions

- *How do data centres contribute to economic growth ?*
- *Output VS Electricity consumption*
- *Productivity per GWh*

The Data Centre Boom: A Rapid Surge in Energy Demand

In Ireland, data centers consumed 22% of the country's total electricity in 2024, amounting to **6,969 Gigawatt-hours (GWh)**, according to the CSO. This was a 10% increase from 2023, with growth fueled by digitalization and AI.





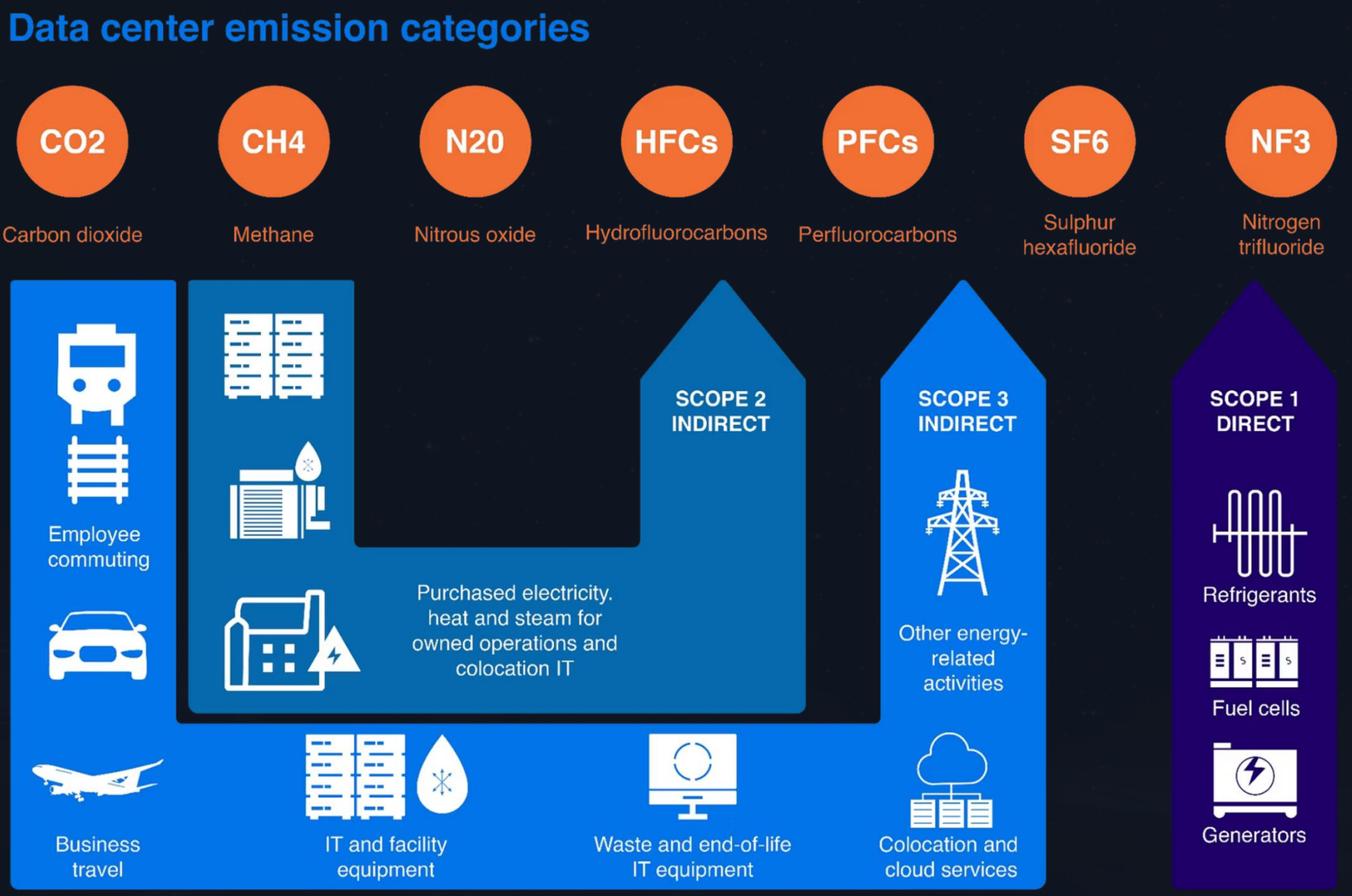
Source : CSO

Dublin: Europe’s Largest Data Centre Hub

Dublin has emerged as Europe's premier data centre location, driven by tax incentives, skilled workforce, and robust connectivity. The capital hosts over 70% of Ireland's facilities, forming dense clusters in areas like Tallaght and Profile Park. This concentration amplifies local energy pressures but positions Ireland as a key player in global digital infrastructure.

Map Source : Digital Reality and Data centre Map

Carbon Emissions of a data centre



While most data centres do not emit carbon directly (as they do not combust fuel onsite), they **indirectly contribute to carbon emissions** through the electricity they consume.

- The carbon intensity depends on **Ireland's electricity generation mix**, where renewables such as wind and solar are growing but gas remains a substantial contributor.
- Therefore, higher electricity demand from data centres translates into higher system-level emissions unless matched by additional renewable capacity.

Measuring Carbon Emissions

Between 2017 and 2023, all additional wind energy generation in Ireland was absorbed by data centres. As data centre demand has expanded at the same rate as renewables generation, renewables are not delivering net reductions in fossil fuel use in power generation. Electricity demand from data centres far outstripped the additional renewable energy being procured through CPPAs between 2020 and 2023, and the proportion of CPPAs undertaken by data centres is itself unknown. *(Friends of the Earth Ireland Data centre Report)*

1.53 Mn Tonnes

Emitted from Data centres' electricity demand in 2023

2.5%

of Ireland's total GHG

or 4.5% of total CO_2 emissions.

Economic Contribution

From an energy economics standpoint, data centres are the physical capital that enables output in the relationship between ICT sector output and data centre electricity demand reflects the **energy elasticity of digital production** — how much economic value is generated per unit of energy consumed.

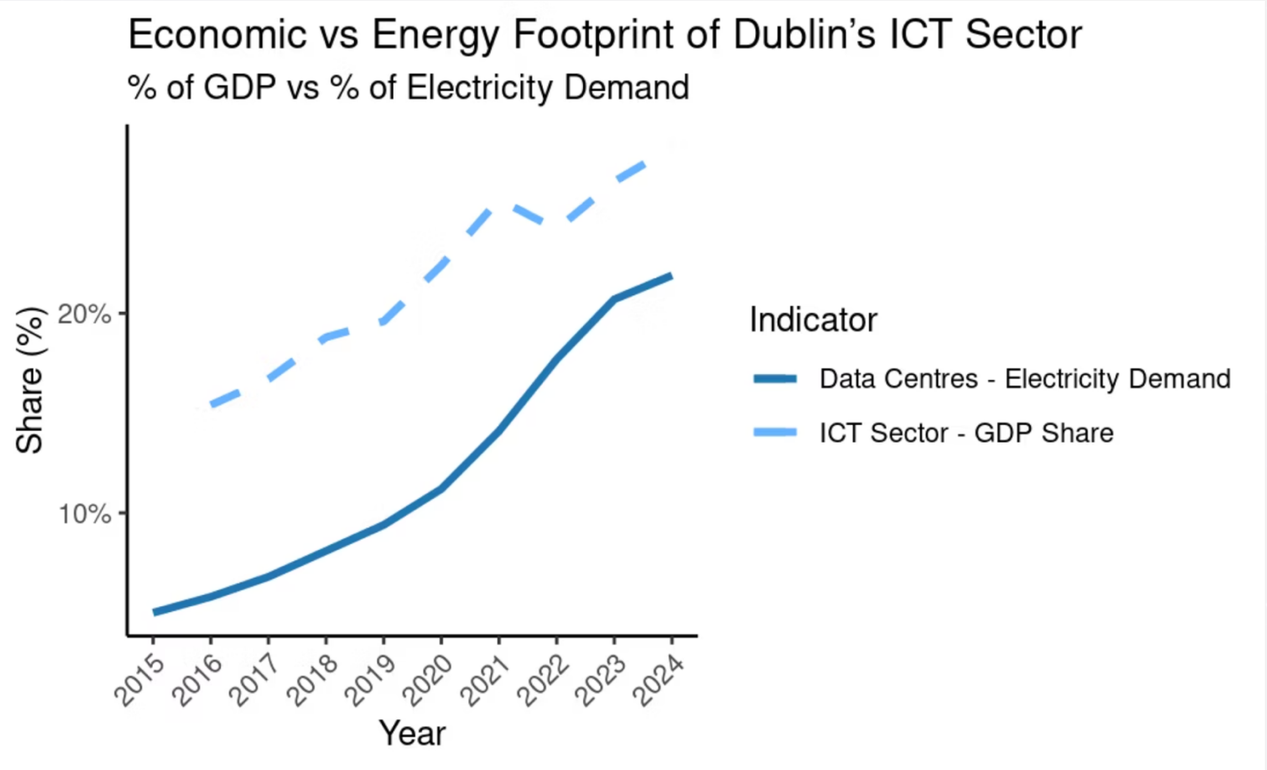
> The ICT sector provides the logical basis for estimating the **Electricity Productivity Ratio (EPR)**, which measures the economic output generated per unit of electricity consumed by data centres. This ratio helps quantify the trade-off — or synergy — between digital expansion and energy sustainability.

Output Share vs Electricity Consumption

The chart shows that between 2015 and 2024, **data centres' share of Ireland's total electricity demand has increased more steeply than the ICT sector's share of total economic output (at current prices)**.

While the ICT sector remains a key contributor to Ireland's output — hovering around **25–28% of total output** — the **energy consumption from data centres alone now accounts for over 20% of total electricity demand**.

Ireland's data centres now consume a share of electricity nearly equal to the ICT sector's entire share of economic output — a sign that the digital economy's energy efficiency is eroding as compute demand accelerates.

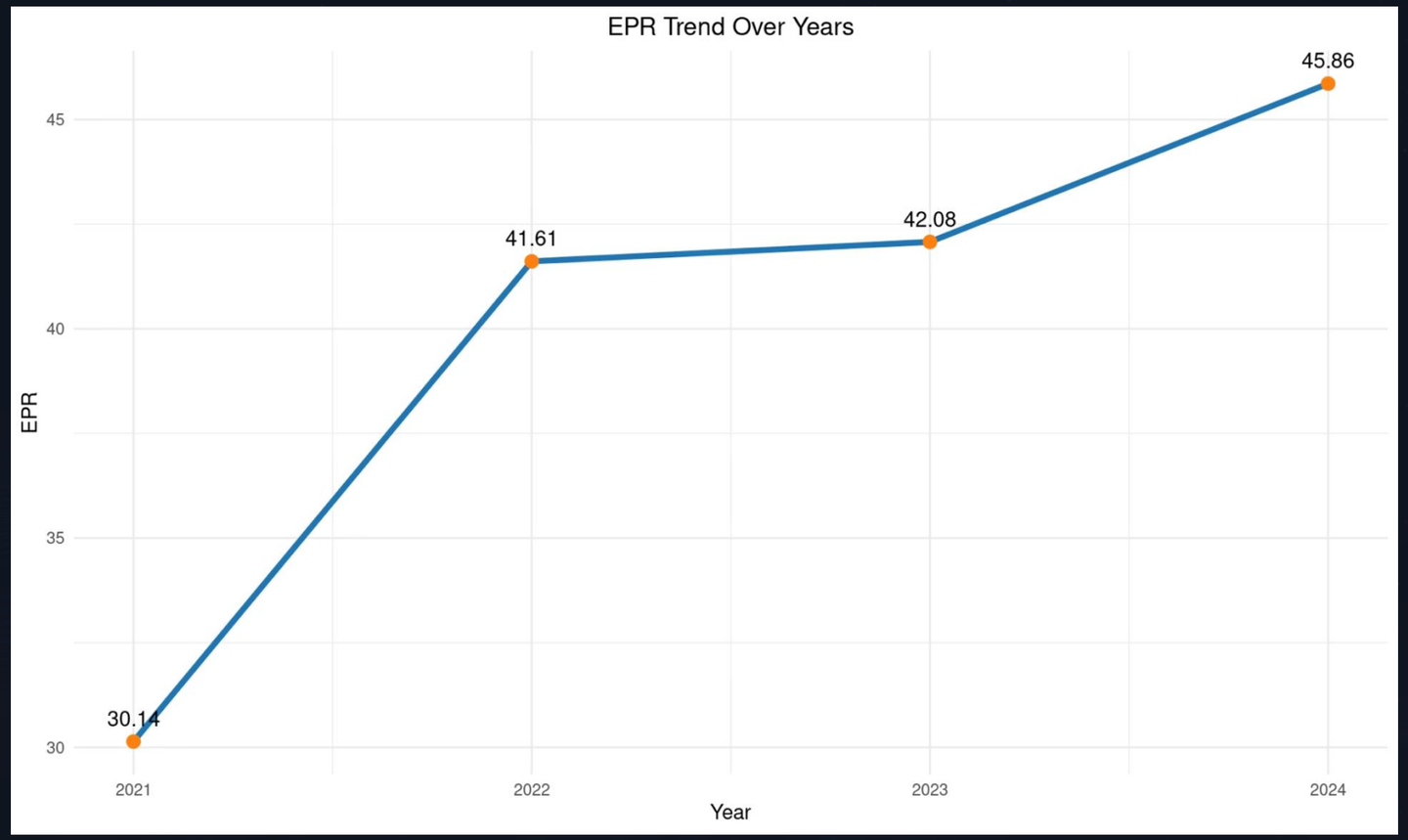


Source : Author's own Calculations based on CSO data

Productivity per GWh

calculating an **Energy Productivity Ratio** (EPR)

$$EPR = \frac{\text{ICT Sector Output (in €)}}{\text{Electricity Consumption of Data Centres (in GWh)}}$$



Currently EPR is rising, which means the sector is **decoupling growth from energy use** i.e., producing more value per unit of electricity.

The sector might be moving toward **higher-value digital services (AI, cloud analytics, SaaS)** rather than electricity-intensive activities (storage, rendering).

> "This pattern is consistent with international evidence — while data centre energy demand continues to rise, output from the ICT sector has grown faster, improving its electricity productivity. This mirrors EU-wide progress in energy efficiency and economic decoupling."

Policy Implications

Government & Energy Regulators

- Prioritise **grid reinforcement and renewable integration** to ensure capacity growth aligns with sustainability goals.
- Introduce **location-based incentives** for new data centres near renewable generation or in areas with grid headroom.
- Strengthen **transparency in energy reporting**, requiring large consumers to disclose renewable sourcing and efficiency performance.

Data Centre Operators

- Commit to **Power Purchase Agreements (PPAs)** directly tied to Irish renewable projects.
- Invest in **energy efficiency technologies** (liquid cooling, AI-based load management).
- Explore **grid-supportive operations** — e.g., demand response participation to stabilise supply fluctuations.

Policy Makers & Local Authorities

- Align **planning permissions** with regional energy strategies.
- Encourage **distributed data infrastructure** — small to mid-sized centres in regions with renewable surpluses.
- Use **economic zoning policies** to balance digital growth and regional equity.

Society & Industry

- Foster **public-private partnerships** around renewable generation projects.
- Promote **green data labels** for cloud services powered by verifiable renewables.
- Highlight the role of data infrastructure as a **digital public good** when responsibly managed

Conclusion

This analysis highlights that Ireland's data centres, while accounting for a growing share of electricity consumption, also anchor a high-value, export-intensive ICT sector whose electricity productivity has steadily improved in recent years.

As Ireland continues its journey toward decarbonisation and digitalisation, the challenge will be to ensure that grid capacity, renewable integration, and energy efficiency evolve in tandem with economic growth.

The data suggest that sustainable growth is possible — but only if policy, infrastructure, and innovation align to make each kilowatt-hour count more towards economic and societal value.