UNIVERSITATEA LUCIAN BLAGA DIN SIBIU

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Digital Infrastructure Empowering Economic Growth

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Structure of the Presentation

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Introduction and Research Objectives

What is a data center?

Specialized facility that houses computing infrastructure, used to process, store, and distribute large volumes of digital information. It enables the delivery of cloud services, AI workloads, and enterprise applications, acting as the backbone of the digital economy.

Why are they important?

Technology Synergy - Enable digitalization across industries

Macroeconomic Influence - Drive economic growth and development (redirecting investment, shifting labor demand, and reshaping energy systems)

"Halo Effect" - Catalyzing growth in renewable energy, manufacturing, digital services

Study Objective

Assess macroeconomic impacts (GDP, jobs, energy, investment)

Analyse case studies and propose policy recommandations

Methodological Framework

Approach

- Mixed Methods (Quantitative + Qualitative)

Data Sources

- OECD, Eurostat, IEA, CBRE, PwC, Statista, BEA

Quantitative Indicators:

- GDP contribution (direct/indirect)
- Employment multipliers
- Annual CapEx
- Electricity consumption
- Renewable energy procurement

Case Studies

- Northern Virginia (US) and Dublin (IE)

Empirical Findings: Economic Contributions

1. GDP Contribution

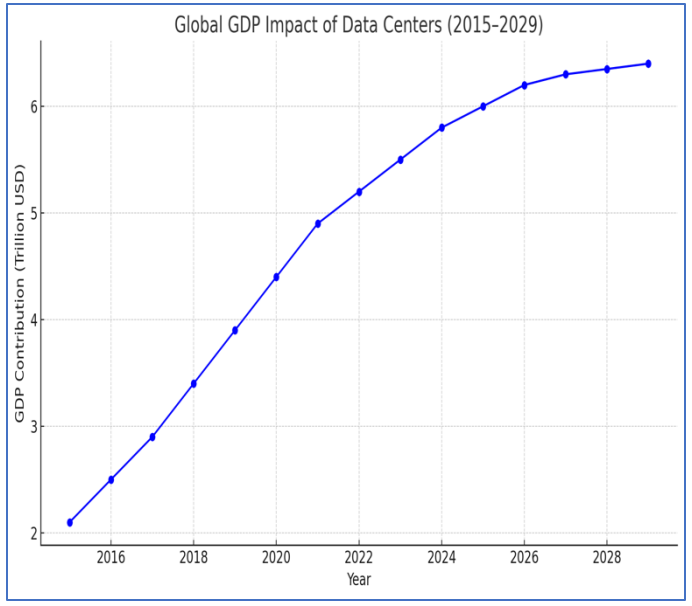
- $5.8 trillion (~6% global GDP)
- $3.5T+ added to U.S. economy (2017–2023)
- EU data economy projected at 6% of GDP by 2025
- Market value: **$416B (2024)** → **$624B (2029)**

2. Employment Generation

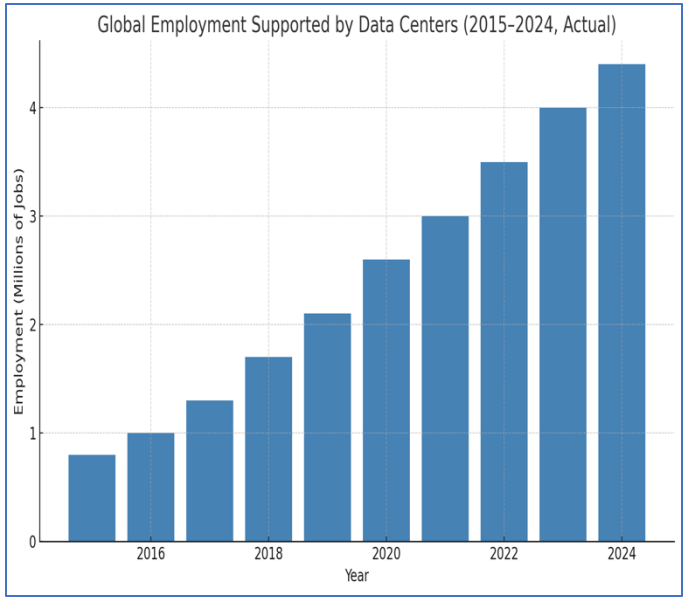
- Each data center job supports **5–7 indirect jobs**
- Jobs rose **20%** to **3.5M** (2017–2021), outpacing 2% overall U.S. job growth (PwC)
- Growth driven by national digital strategies globally

3. Infrastructure Investment

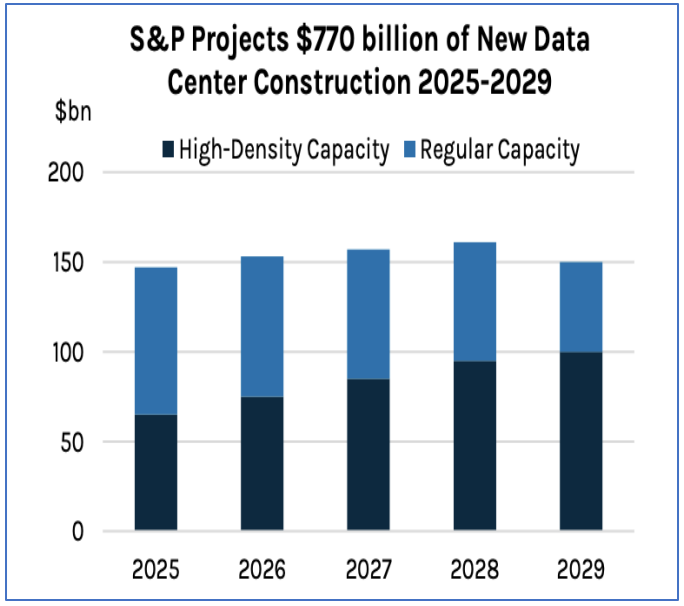
- Typical project: **$1B+**, capital-intensive
- Investment includes land, construction, power systems, cooling, and fiber
- Capex investment: $50B (2017) → **$200B** per year (2024)



Source: *Data Center Colocation Market – Global Outlook & Forecast 2023–2028*, Arizton Advisory & Intelligence



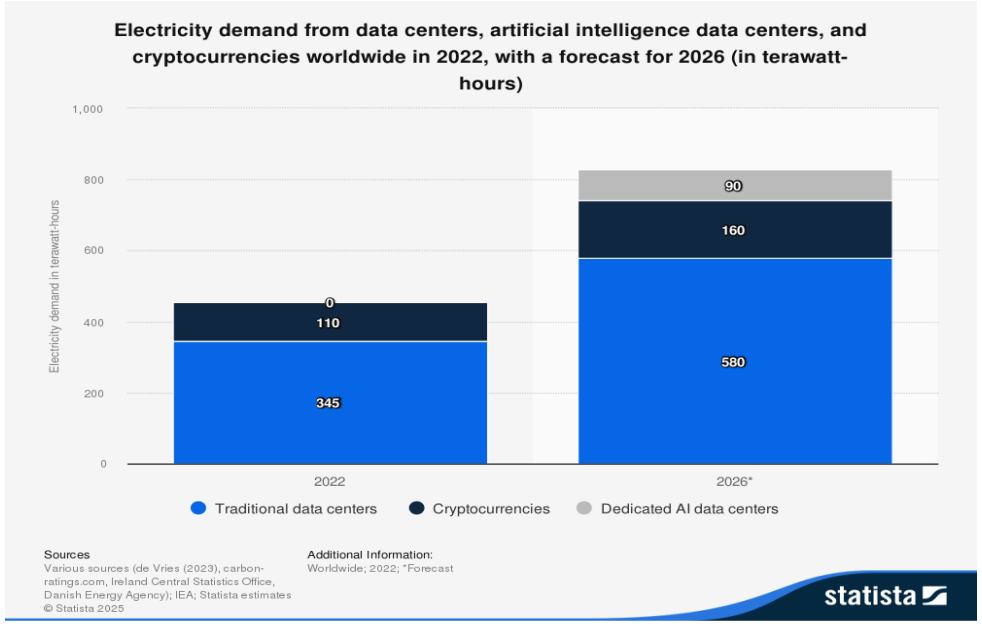
Source: *The People Challenge: Global Data Center Staffing Forecast 2021–2025*, Uptime Institute

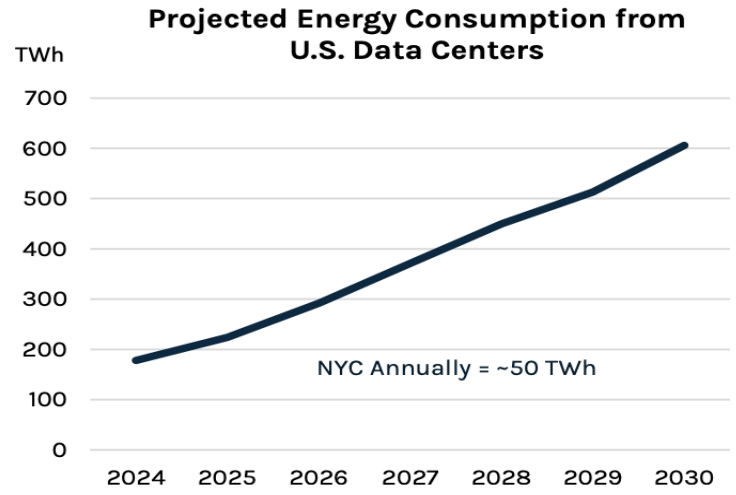


Source: *S&P, 451 Research (2024)*

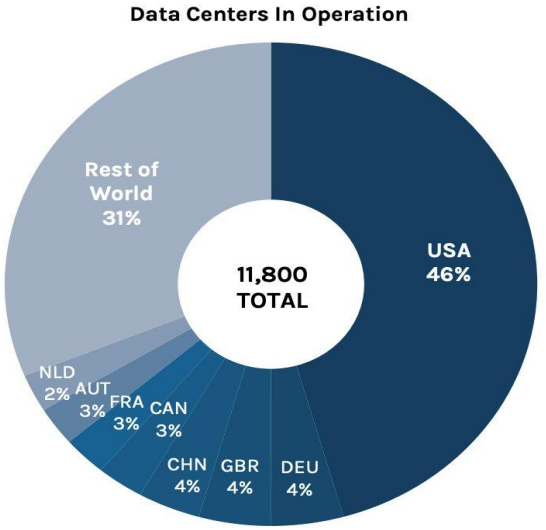
Energy Demand and the Transition to Sustainability

- **Energy Consumption**:
  - 2024: 470 TWh (~2% global electricity)
- **Green Energy Adoption**:
  - Renewable procurement rose from 2 GW to 50 GW (2015–2024)
  - Leaders: Amazon, Google, Microsoft
- **Efficiency Innovations**:
  - Liquid cooling
  - AI-powered resource management
  - Heat reuse (in Nordic countries)





Source: McKinsey, Global Energy Perspective (2023).



Source: The World Ranking (January 2025).

Halo Effect: Dublin vs. Northern Virginia

Aspect	Dublin	Northern Virginia
Market Size (2023)	$3.32 billion	$31.4 billion
Job Creation	1,100+ construction jobs; 165 permanent roles	78,140 total jobs supported
Energy Consumption	21% of national electricity	4% of Virginia's electricity usage
Policy Environment	Moratorium on new connections until 2028	Supportive policies with tax incentives
Economic Clustering	Growth in SaaS, tech, and infrastructure firms	Growth in cybersecurity, cloud, and public-sector IT

Results

Economic Impact

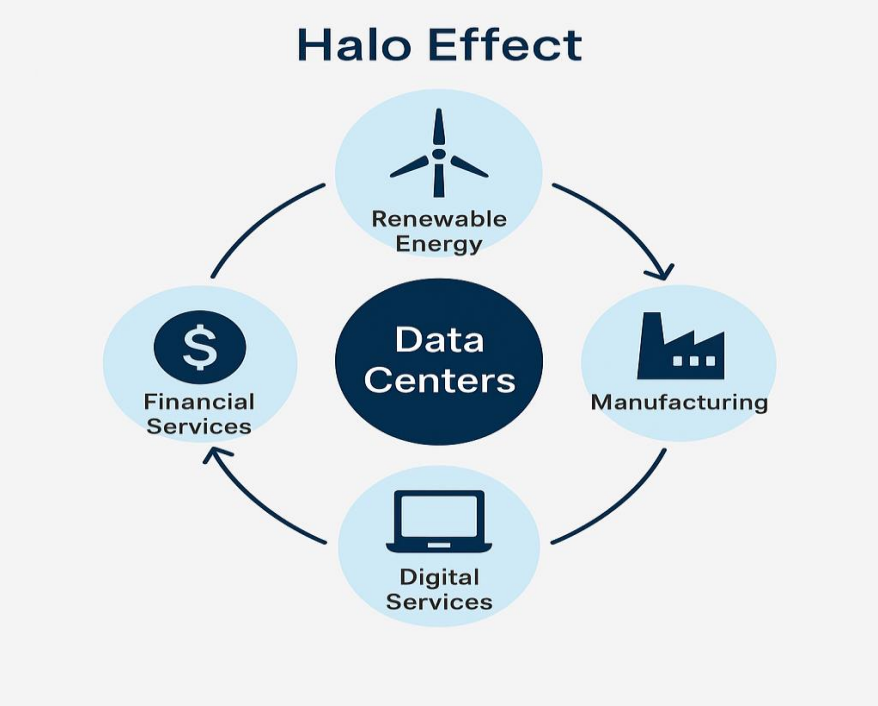
- GDP contribution: $2.1T → $5.8T
- Jobs supported: 0.8M → 4.4M
- Annual CapEx: $50B → $200B
- Renewables: 2GW → 50GW

2015–2024

2029

Forecasts

- GDP impact > $6.4T
- Employment > 5.4M
- Investment > $500B
- Renewables > 70 GW



Conclusions and Policy Recommendations

Macroeconomic Significance:
The study confirms that data centers have evolved into vital macroeconomic infrastructure with multi-dimensional impacts on global economic performance.

Growth Trends (2017–2024):
Strong upward trajectories in global economic contribution, job creation, capital expenditure, and renewable energy procurement.

Persistent Disparities:

Spatial: Concentration in urbanized, high-capacity regions risks widening regional inequalities.	Sectoral: Tech and finance benefit directly, while manufacturing, education, and retail depend on digital spillovers.

Strategic Policy Recommendations:

Integrate data centers into national planning frameworks.	Use incentives and zoning to drive sustainable, equitable expansion.	Strengthen digital infrastructure in underserved regions.	Foster cross-border cooperation on data flow and energy governance.

Thank you for your attention!