Scottish Enterprise



Green Data Centres: Approach to Estimating Economic Impact v2

SE Appraisal & Evaluation
February 2025

Aims and method

- Articulate the potential economic impacts of the data centre industry opportunity in Scotland – across:
  - hyperscalers
  - distributed computing
- Illustrate impacts from both the capex/construction and ongoing operation (over 15 years)
- Present different scenarios based on current understanding of inward investment proposals and growth in demand
- Economic impact will be expressed through:
  - Jobs: construction Person Year Equivalents (PYEs) and operational Full Time Equivalents (FTEs)
  - Gross Value Added (GVA): a quantitative measure of how much value any economic activity adds during its production i.e. the difference in the price of products/outputs and inputs, plus wages spend.
- Highlight the wider range of expected benefits

Following discussion in SE, the impact model has been revised to consider hyperscale datacentres as **"cost centres"** rather than "profit centres", on the basis that ownership may be located elsewhere and it is unclear if profits will be registered in Scotland (or the UK). For the purposes of this modelling, the key direct economic benefit/GVA contribution (beyond the construction phase) is the operational jobs rather than from turnover and profit. This is consistent with SE's usual approach to inward investment of this type and our Appraisal & Evaluation Guidance. **Construction PYE jobs** have also been modified to be more in line with estimates for other UK data centre proposals, rather than simply average turnover/job for the construction sector in Scotland.

In addition, we have considered different scenarios for the **proportion of Scottish content** during the construction phase, on the basis that seeking to increase this will be a priority for SE and public sector partners.

Scenarios for Green Data Centres in Scotland to 2040

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A) Max roll-out

- 3GW of hyperscale capacity
- 2.5GW of distributed computing across 100s of sites
- Total capital investment of **£43.8bn**

38,800 one-off job years from construction (net PYEs) – 14,100 in construction sector and 24,700 in electrical equipment

3,240 net FTEs by 2040

£17.6bn cumulative net GVA to 2040

66,000 GWh of heat to 2040 (from distributed computing) – worth £4.1bn at current rates

B) Medium roll-out

- 1 GW of hyperscale data centres
- 500 MW of distributed computing
- Total capital investment of **£12bn**

10,900 one-off job years from construction (net PYEs) – 4,000 in construction sector and 6,900 in electrical equipment

880 net FTEs by 2040

£5.0bn cumulative net GVA to 2040

15,000 GWh of heat to 2040 (from distributed DCs) – worth £946m at current rates

C) Low roll-out

- 250 MW of hyperscale capacity
- 50 MW of distributed computing date centre
- Total capital investment of **£2.5bn**

2,270 one-off job years from construction (net PYEs) – 830 in construction sector and 1,430 in electrical equipment

175 net FTEs by 2040

£1.1bn cumulative net GVA to 2040

1,500 GWh of heat to 2040 (from distributed DCs) – worth £94m at current rates

All impacts at Scotland level. Cumulative/future figures have not been discounted, which is necessary if calculating an RoI on any public sectors costs/support.

Hyperscalers – EIA assumptions

Various inward investment propositions at differing confidence levels grouped as different scenarios, with each location built up from 50MW server halls

Construction phase

Cost breakdown

- Construction (38%)
- Mechanical & electric equipment, including servers (62%)
- Excludes land purchase costs, estimated to be around 1% on top of above

- Construction: Assumed 75% of construction spend occurs in Scotland. Displacement average of 18%.
- £430m figure sourced from Soben report (2024)
- M&E equipment, such as generators and transformers: there is potential for some of this spend to be captured in Scotland (assumed 20% when calculating impacts)
- Multiplier effects to show indirect/induced benefits across supply chain and wider economy from:
  - SIC 41-43: Construction
  - SIC 27: Electrical Equipment
- PYE jobs in construction benchmarked to current major data centre proposals in UK – averaging **£1.3m capex per construction PYE.** For manufacturing, the average turnover/job for SIC 26-27 has been used (SABS 2022).

Operational phase

- Operational turnover at 8.6% of capex annually
- GVA derived from average GVA per worker in Information Services (£122K, 2022 data uprated to 2024) according to latest DSIT statistics

- Employment: **0.5 FTEs per MW** – consistent with Scottish proposals and evidence from elsewhere (see next slide)
- **Operational GVA derived from jobs only** – assume leakage of profits outside of Scotland.
- No market displacement due to growing demand.
- Employment leakage likely minimal, but there will likely be some labour market displacement (i.e. poaching) as the industry grows.
- Multipliers effects from SIC 63 – Information Services.

Economic multipliers

SIC		Type II Multiplier	
		Jobs	GVA
41-43	Construction	1.8	1.9
27	Electrical equipment	1.8	1.6
63	Information services	1.3	1.5

Hyperscalers – EIA assumptions

Jobs per MW – available evidence

Data Centre	Direct Jobs	MW	Jobs per MW
Digital Reef, Havering, UK – proposed (source)	300	600	0.5
Blackstone, Blyth, UK – proposed (source)	300 - 400	1,100	0.27 – 0.36
DC01UK, Hertfordshire, UK – proposed (source)	200	320	0.63
Elite UK REIT, Blackpool, UK – proposed (source)	50	72	0.69
Google, Skien, Norway (source)	100	240	0.42
Stack, Toronto, Canada (source)	30 - 50	56	0.54 – 0.89
Inward investment proposal, Scotland	150	300	0.5
Inward investment proposal, Scotland	50 – 70	100	0.5 – 0.7
Inward investment proposal, Scotland	154	200	0.77

What are Data Centre Jobs?

- Data centres require a range of different roles, including those related to maintaining and monitoring the IT infrastructure and network, and maintenance of the mechanical and electrical infrastructure. Generally there is a staffing presence 24/7.

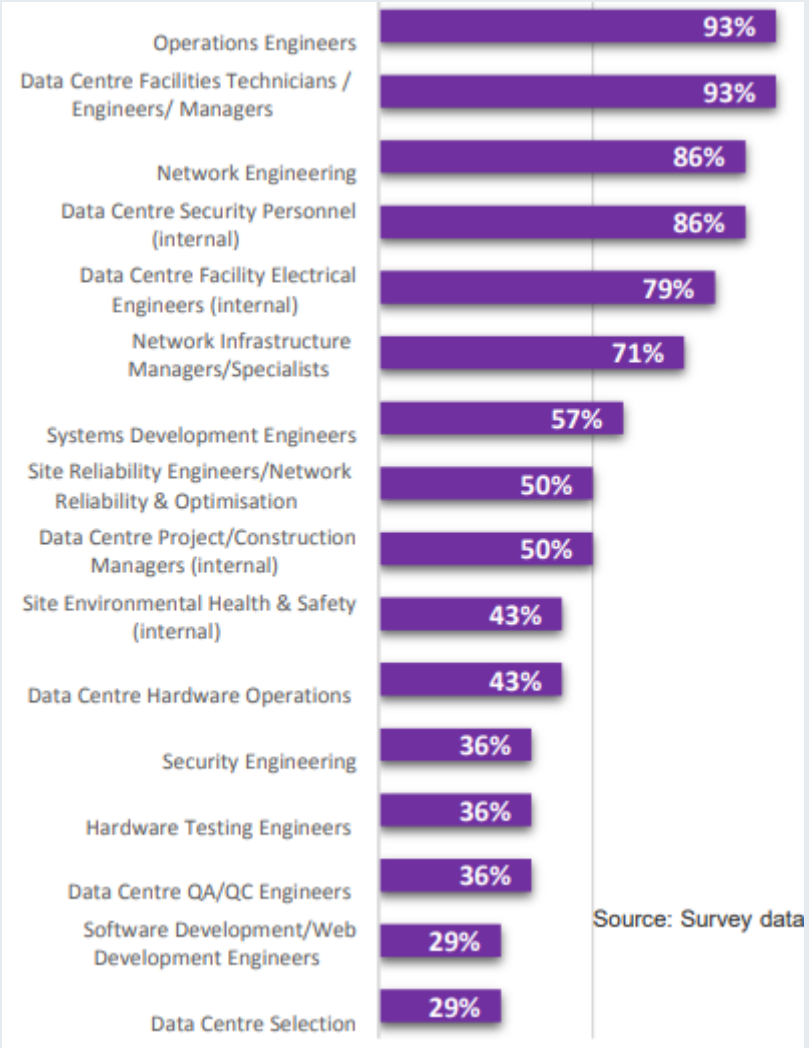
- A review of data centre job postings on totaljobs.com shows a wide range of roles across:
  - Data centre construction (project management, cost control etc) – reflecting current growth in industry
  - Technical and engineering operational roles – in £40k to £60k wage range
  - Data centre site security roles – typically at or close to minimum wage

- Labour shortages are one of the key issues impacting the growth of the industry. A 2023 survey of operators found more than half (53%) reported having difficulties in finding new talent, up from 38% in 2018. In addition, 42% reported difficulties with retaining staff, up from 17% in 2018. This is further supported by LinkedIn data, which shows a high job turnover rate, indicating employers are poaching staff from one another, likely pushing up wages - Savills (2023)

- Average wages for an FT post in Information Services (SIC 63) in Scotland in 2022 was £36k, 14% higher than the average of all jobs (SABS 2022)

Data centre operators with staff carrying out these functions

Based on a survey of 18 data centre operators in Ireland, 2018.



Source: IDA Ireland

Worked Example – Hyperscale Data Centre

Capital cost: £430 million
Size: 50 MW (one hall)

Construction impacts

Employment

- **400 net PYE jobs** over two year construction period (200 per year):
  - 160 PYEs in the construction industry (90 without multiplier effects)
  - 240 PYEs in electrical equipment manufacturing (140 without multiplier effects) – based on the assumption that 20% of electrical equipment spend is captured in Scotland

GVA

- **£137m cumulative net GVA** over two year construction period (£68.5m per year):
  - £95m net GVA in the construction industry (£49m without multipliers)
  - £42m net GVA in electrical equipment manufacturing (£26m without multipliers) – again based on the assumption that 20% of electric equipment spend is captured in Scotland

Operational impacts

Employment

- **25 direct jobs** @ 0.5 FTE per MW
- **30 net jobs** taking account of those in the supply chain and induced through employee wage spend (25 without multiplier effects)

GVA

- **Operational turnover of £37m per year** @ 8.6% of original capex
- **Net GVA of £4.2m per year** (£2.7m without multiplier effects)
- This gives **cumulative net GVA of £62.5m over 15 years of operation** (£41.0m without multiplier effects)

Combined construction & operational impact (over 17 years) from 50MW data hall: £199m GVA
With a typical hyperscale data centre built up from multiple blocks of 50MW

Wider benefits that could be realised

- Skills and education – links to colleges and universities
- Supports tech and AI ecosystem (anchoring businesses in Scotland) and digital resilience/security
- Heat recovery – scope for this to be embedded in hyperscale developments
- Potential community benefits from developers and operators – one-off and ongoing
- Emissions savings – *if displacing* datacentres that are not powered by renewable energy
- Incentivises and helps commercial case for renewables development
- Signifies Scotland is open to inward investment and tech development

All impacts at Scotland level. Cumulative/future figures have not been discounted, which is necessary if calculating an RoI on any public sectors costs/support.

Distributed Computing – EIA assumptions

A small number of active live proposals, but – pending outcome of initial pilots – potential to be rolled out across the country and in different industries and contexts.

Construction phase

Cost breakdown:

- Estimated total £25m - £30m for a single-site 4MW data centre.
- Cost breakdown assumed to be in line with hyperscale data centre

- Construction: more scope for leakage given smaller scale of projects (i.e. specialist contractor from outside Scotland). Less scope for displacement.
- Electrical equipment: providers likely to use same equipment across UK, so unclear if any can be captured in Scotland
- Multiplier effects to show indirect/induced benefits across supply chain and wider economy from:
  - SIC 41-43: Construction
  - SIC 27: Electrical Equipment
- PYE jobs based on average turnover / head of employment for each sector and GVA on average ratio of turnover to GVA for the sector

Operational phase

- Operational turnover at 8.6% of capex annually
- GVA derived from average turnover/GVA ratio for SIC 63 – Information Services

- Employment: as with hyperscalers, assume 0.5 FTEs per MW
- Likely leakage of profits outside of Scotland. No market displacement due to growing demand.
- Employment is small scale so unlikely to be leakage/displacement
- Multipliers effects & turnover/GVA ratio from SIC 63 – Information Services (see table on Slide 3)

Low cost heat for co-located services, businesses or homes

- Cost savings (low cost/free heating) – a 4MW data centre can generate an estimated 16.3GWh of heat annually. At the current OFGEM price cap (6.24p/KWh), this is worth around £1m.
- Environmental benefits from a reduced requirement for gas powered heating. 16.3GWh of ‘free heat’ provides scope 1 CO2 savings of 3,300 tonnes per year.

Worked Example – Distributed Computing

Capital cost: £ 27.5 million
Size: 4 MW

Construction impacts

Employment

- **10 net PYE jobs over construction period (falling within one year)**
  - 7 PYEs in the construction industry (4 without multiplier effects)
  - 2 PYEs in electrical equipment manufacturing (2 without multiplier effects) – based on the assumption that 10% of electrical equipment spend is captured in Scotland

GVA

- **£6.1m cumulative net GVA** in one year construction period:
  - £4.8m net GVA in the construction industry (£2.5m without multipliers)
  - £1.3m net GVA in electrical equipment manufacturing (£800k without multipliers) –based on the assumption that 10% of electric equipment spend is captured in Scotland

Operational impacts

Employment

- **2 direct jobs** @ 0.5 FTE per MW (likely part of a remote team maintaining multiple sites)
- **3 net jobs** taking account of those in the supply chain and induced through employee wage spend (2 without multiplier effects)

GVA

- **Operational turnover of £2.4m per year** @ 8.6% of original capex
- This generates **net GVA of £1.5m per year** (£1m without multiplier effects)
- This gives **cumulative net GVA of £22.5m over 15 years of operation** (£15m without multiplier effects)

Combined impact from construction & operation (over 17 years)

£26.5m GVA

Low cost or free heat for co-located services, businesses or homes

CO2 savings from reduced demand for gas powered heating

All impacts at Scotland level. Cumulative/future figures have not been discounted, which is necessary if calculating an RoI on any public sectors costs/support.

What if we boosted Scottish spend?

Scenario	Construction spend	50% Scottish	75% Scottish	85% Scottish
	Equipment spend	**10% Scottish**	**20% Scottish**	**40% Scottish**
Max roll-out	Construction PYEs	9,400	14,100	16,000
	Manufacturing PYEs	12,400	24,700	49,400
	Construction & fit-out GVA	£8.9bn	£13.7bn	£19.9bn
Medium roll-out	Construction PYEs	2,640	4,000	4,500
	Manufacturing PYEs	3,460	6,900	13,800
	Construction & fit-out GVA	£2.5bn	£3.8bn	£5.6bn
Low roll-out	Construction PYEs	560	830	940
	Manufacturing PYEs	720	1,430	2,900
	Construction & fit-out GVA	£515m	£795m	£1.2bn

Potential timeline for max. scenario

MW coming onstream																	
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**Total MW at site**
Site 1			50	150	200	100											500
Site 2			50	50													100
Site 3				50	50	50	100	100	50	50		50					500
Site 4				50		100		50									200
Site 5				50	50	100	50	50		50		50	50				450
Site 6					50	100	100										250
Site 7				50		50		50									150
Site 8					50		50	50		50		50		50			300
Site 9					50	50	100	100					50				350
Site 10				50	50				50	50							200
Hyperscale total	0	0	100	450	500	550	400	400	100	200	0	150	100	50	0	0	3000
Distributed computing		10	20	70	100	150	150	250	250	300	200	200	200	200	200	200	2500
Total annual MW	**0**	**10**	**120**	**520**	**600**	**700**	**600**	**700**	**400**	**500**	**250**	**350**	**300**	**250**	**200**	**200**	**5,500**

The timeline presented is purely speculative and has been drawn up to allow economic impact modelling to be undertaken

Potential timeline for med. scenario

MW coming onstream																	
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**Total MW at site**
Site 1			50	50	100	100	50										350
Site 2				50	50												100
Site 3					100	100	50	50									300
Site 4							50	50									100
Site 5								50	100								150
Hyperscale total	0	0	50	100	250	200	150	150	100	0	0	0	0	0	0	0	-
Distributed computing		10	10	20	20	40	40	50	50	50	50	50	40	50	10	10	500
Total annual MW	**0**	**10**	**60**	**120**	**270**	**240**	**190**	**200**	**150**	**50**	**50**	**50**	**40**	**50**	**10**	**10**	**1,500**

The timeline presented is purely speculative and has been drawn up to allow economic impact modelling to be undertaken

Potential timeline for low scenario

MW coming onstream																	
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**Total MW at site**
Site 1			50	50													100
Site 2						50											50
Site 3								50	50								100
Total HS	0	0	50	50	0	50	0	50	50	0	0	0	0	0	0	0	
Distributed computing		5		5		5		5		5	5	5	5	5		5	50
Total annual MW	**0**	**5**	**50**	**55**	**0**	**55**	**0**	**55**	**50**	**5**	**5**	**5**	**5**	**5**	**0**	**5**	**300**

The timeline presented is purely speculative and has been drawn up to allow economic impact modelling to be undertaken

Potential heat offtake from green data centres

- A 4MW data centre can generate an estimated 16.3GWh of free or low cost heat per year (based on technical information gathered from industry)
- Based on the scenarios for distributed computing set out earlier, this could generate, to 2040:

Max.

- 66,000 GWh of heat, worth £4.1bn at current gas prices
- Based on 2.5GW data centre capacity, phased to 2040

Med.

- 15,000 GWh of heat, worth £946m at current gas prices
- Based on 500MW data centre capacity, phased to 2040

Low

- 1,500 GWh of heat, worth £94m at current gas prices
- Based on 50 MW data centre capacity, phased to 2040



- This does not include any heat recycling benefits from hyperscale data centres