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Concert Roundtable:

Building Sustainable Data Centres

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Data centres enable everything we do online, from powering the internet to making digital communication and connection possible. As a building use in the built environment, data centres have a comparable high energy use, water use and emissions. The sector is working hard to reducing all three so what does it really mean for a data centre to be sustainable?

Simply put, a sustainable data centre is one that minimises its environmental impact while still providing reliable and secure data processing and storage services. It involves prioritising energy efficiency, utilising renewable energy, conserving water and reducing waste.

> **F gas losses are the single biggest source of CO2 emissions across our estates and we are taking active steps to reduce them and on future developments to remove them all together.**

Pip Squire
Head of Energy & Sustainability
Ark Data Centres

Decarbonising the grid on a national level

The ability to decarbonise the grid could represent a critical stride towards achieving environmentally-conscious data centre operations. By transitioning to cleaner energy sources and implementing energy-efficient technologies, data centres could contribute significantly to the broader goal of achieving a greener grid. Scope 1, scope 2 and scope 3 carbon emissions all need to be considered in terms of how we think about net zero data in the context of data centres. As far as the SAS acronym goes: security, availability, sustainability, the latter has increasingly come to the fore, aligning with global initiatives to combat climate change.

Direct air capture systems are crucial to carbon capture

Extracting carbon dioxide directly from the atmosphere through direct air capture (DAC) within data centre infrastructure can also contribute significantly to sustainable data centre operations. This process faces several challenges. Energy consumption could be a concern as DAC processes require significant power and integration with existing data centre integration can be complex and scalability may come at significant cost to align with the industry's commitment to environmental responsibility.

“

In terms of embodied carbon, there are opportunities to reuse existing buildings as data centres...it’s our job to reduce our impact by reusing existing materials.

”

Gary Elliott
Chief Executive
Elliott Wood Partnership

The circular economy and data centres

Efforts are being made to reduce carbon footprint through structural and engineering elements. That said, just 15% of data centres are the outside structure and yet that’s what everyone is currently focussing on, but there needs to be much more thought given to the remaining 85%.Beyond the buildings themselves, the servers are of values and are changed every three years so this frequent replacement needs to be factored in. The London Plan considers the principles of the circular economy, designing out waste and designing for longevity. Though there is an issue with floor to ceiling height, there is scope with a decent amount of existing building stock.

The optimum data centre operational capacity

Data centres designed for 100% capacity, often operate at 50-70%. It may be argued that this enables scaling during peak demand and maintains a balance between performance and reliability. However, it could be said that unutilised servers still consume physical space, power and cooling resources leading to a higher cost per unit of processing and lower return on investment. Then there is the environmental impact of data centres, with energy consumption remaining constant while output doesn't reach its potential, affecting the agility and responsiveness of the data centre.

"If you take steel as an example, there's the possibility to reuse existing steel in new data centres, using industry protocols such as the SCI P427 Structural Steel Re-use document. It's an emerging world of reuse."

Ian Poole
Associate Sustainability Consultant and Engineer
Elliott Wood Partnership

> **“You have these planning policies which rely on consultants and experts being able to correctly interpret them in the way that authorities determine they should be interpreted and that presents a challenge.”**

Dan Smyth
Director Environment & Infrastructure
Savills

Uncertainties within the electricity market

The state of the UK electricity market poses a significant challenge to data centres, particularly in pioneering environmentally conscious practices. Increasing demand, coupled with intermittent and less developed renewable energy sources particularly compared with other countries, creates an environment of uncertainty and higher costs. Fluctuating energy prices and potential supply chain disruptions further complicate operational planning and budgeting for data centres. A balance needs to be struck between the green agenda and ensuring a stable, cost-effective power supply to avoid becomes a complex juggling act for data centre operators in navigating the evolving landscape of the UK electricity market.

The Greater London Authority’s position

While well intentioned, the Greater London Authority’s (GLA) approach towards data centre planning proposals can be overly prescriptive, something which hasn’t really changed since the early 2000s. This can hinder the early stages of planning and design of data centres. A greater openness by the GLA to understanding how modern-day data centres can and should operate needs to happen otherwise it risks impeding innovation. By incorporating evolving data and insights the GLA, working closely with the data centre industry, could improve not only the provision of data now and in the future, but also the overall development of the urban landscape.

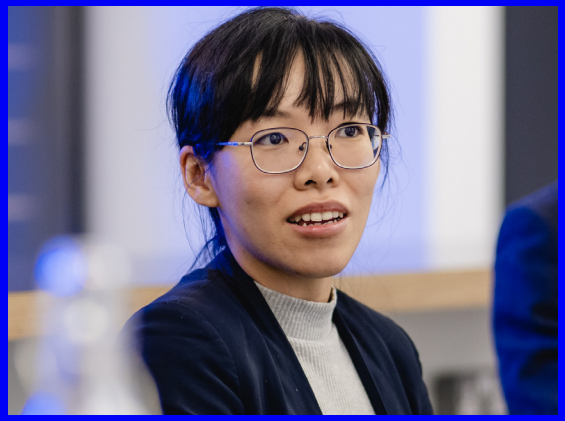
Local Authorities and Carbon Tax

There is a pressing need to educate Local Authorities in the UK on the allocation of Carbon Tax. As these funds are imposed to incentivise environmentally responsible practices, so it is important that the generated revenue is strategically invested.

Educating local authorities on the nuanced complexities of the data centre industry will empower them to make more informed decisions. In this way, a more collaborative approach could be encouraged between the industry and regulatory bodies.

UK housing and the potential for district heating networks

The utilisation of low-grade heat in UK housing within district heating networks is currently underappreciated and underutilised. To optimise energy efficiency and reduce carbon emissions, it is imperative that the government prioritises retrofitting older homes and designing newer housing with the capacity to harness low-grade heat within district heating networks. This would spearhead a transformative shift towards more sustainable communities.



> **“District heating is really important, what we need to do is prioritise it as a process.”**

Ka Ki Liu
Principal Mechanical Engineer
Black & White Engineering

> **“District heating, sourced from data centres, could help them to be seen as a better neighbour contributing to the local community; turn waste heat into a positive.”**

Sam Stevens
Head of Advanced Technologies Sector
Scott Brownrigg

Successfully building communities around data centres

In the Nordic countries, success stories abound where data centres have been strategically located in proximity to residential areas. There local communities have successfully leveraged the heat generated by data to warm nearby homes and communal facilities. This innovative approach showcases the feasibility of integrating data centres into the fabric of everyday living for mutual environmental and societal benefits, setting a positive precedent for other regions.

> **“If we’re going to tackle the issues it will most likely need to be driven at a government level.”**

Paul Scriven
Energy and Sustainability Director
HDR

Rewriting Environmental Permitting system and obligations

As part of a more robust and responsive regulatory framework, there is a need to overhaul the Environmental Permitting system and associated obligations. This would enhance their efficiency and transparency, addressing emerging environmental concerns and streamlining the process for both regulators and stakeholders. By revamping the system, this would not only better foster environmental stewardship but ensure a harmonious balance between economic activities and ecological preservation.

“It’s about attributing value to materials we can reuse and not simply thinking about those products as scrap.”

Obi Onuora
Area Director
Black & White Engineering

“Circularity of building materials is going to play a greater role in sustainable data centre design, and engaging with demolition contractors earlier in the process can help unlock opportunities for urban mining and reuse of carbon intensive materials.”

Alex Soto
Associate Director & Head of Sustainability
studioNWA

Better data centre education

There needs to be much better ongoing education about data centres, considering their increasing relevance in daily life. This education piece needs to start earlier, with more emphasis on STEM (Science, Technology, Engineering, and Mathematics) initiatives, focusing on outreach programs to schools. The general population needs to be made more aware of their personal data use and the need for ever more data centres and the impact that has on the planet.

“If you are live streaming a movie on a train travelling at 70mph you are consuming as much energy – end to end from the hand-held device, through the networks to the servers in data centres – as cooking your porridge in a microwave.”

Pip Squire
Head of Energy & Sustainability
Ark Data Centres

Conclusion

This comprehensive analysis delved into the intricate landscape of sustainability challenges, technological advancements, and collaborative prospects within the data centre industry. Evidently, there exists a pressing need to underscore circular economy initiatives and the judicious reuse of materials to effectively tackle waste challenges.

District heating is an area of particular interest. What is imperative is an ongoing commitment to refining processes, fostering meaningful intersectoral collaboration, and actively engaging with government agencies and educational institutions towards a more sustainable future.

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Thank You

Get in touch to bring harmony
to your project today

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