



ARUP

Exploring net zero data strategies in the built environment

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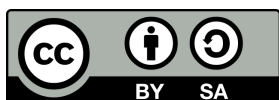
About

This paper has been researched and produced by the Open Data Institute (ODI) in collaboration with our partner, Arup, and is published in June 2023. Its lead author was Josh D’Addario, with support from Sherrelle Parke and Ian Cheng. If you want to share feedback by email or would like to get in touch, contact us at research@theodi.org.

This paper explores an emerging area of thought in both data strategy and climate action. It is intended to spark discussion around the need for a carbon data strategy for a net zero economy, or a ‘net zero data strategy’, and how it might be put into practice, unearth examples of net zero data strategies – especially in the built environment – and encourage collaborative working to build momentum in the sector.

The research undertaken included a review of the data landscape and identification of case studies, and informal discussions with partners in the space. It builds on our previous work on data strategy, the value of data sharing, data infrastructure for climate action, and data sharing in the built environment.

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How can it be improved? We welcome suggestions from the community in the comments

Executive summary

It is widely acknowledged that the climate and biodiversity crises are real and imminent and that there is an urgent need to contain the rise in temperature above pre-industrial levels to less than 1.5°C. Many countries and sectors are developing strategies to reach net zero – cutting carbon emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere.

Achieving these goals requires the development of strategies for how we collect, use and share carbon data at business, sectoral, national and global scales. However, the concept of a carbon data strategy for a net zero economy, or a ‘net zero data strategy’, is still in its infancy.

A net zero data strategy should enable organisations working in the built environment and across sectors to use data better to reduce carbon emissions through more efficient and decarbonised operations. In addition, there is the need to reduce embodied carbon emissions, through a granular data-informed approach to decarbonisation.

A net zero data strategy should also look beyond better data use internally and prioritise data sharing to improve transparency about emissions. This transparency is critical for measuring and validating global progress towards net zero goals and differentiating this from ‘greenwashed’ or unfounded claims.

A net zero data strategy should also encourage built environment organisations to explore data sharing for both altruistic reasons and to accelerate systems change. The latter is achieved by providing open and shared data that enables innovation and the creation of scalable net zero solutions.

Although there is currently no blueprint for a net zero data strategy, the building blocks are beginning to emerge. They include:

- Building and maintaining strong data infrastructure, such as data catalogues, data access technologies such as APIs, open standards and data institutions.
- Implementing robust data governance, ensuring organisational alignment with the net zero data strategy and defining responsibilities for net zero data actions.

- Cultivating data literacy and skills, not just in data science but in thinking critically about data and examining the impact of different approaches to collecting, using and sharing data.
- Operationalising data ethics and evaluating data practices that have the potential to adversely impact people and society through data collection, sharing and use.
- Starting a cultural change, promoting data leadership, valuing data assets and focusing on whole-system user experience.

This paper brings together the best of what we have seen – both within and beyond the built environment – and what colleagues from across the worlds of data and the built environment have shared with us since we began this project in November 2022. We hope this will stimulate further debate and help us to define best-practice net zero data strategies, which is imperative to combatting the climate crisis.

Arup and the ODI – 10 years of partnership

This paper is the latest piece of work to emerge from the 10-year partnership between Arup and the ODI. Founded in 1946, Arup now has more than 18,000 people working in 94 offices across 34 countries and its projects have taken it to more than 130 countries.

Over the past decade, the ODI and Arup have worked together to identify new trends and challenges in the future of the aviation industry, providing expert advice on diverse business models across the data spectrum, setting out the case for net zero data strategies and delivering data skills training.

More recently, we worked together to explore the possibilities for city authorities across the world to improve public services using data¹ and to explore new approaches for sharing data in the built environment.²

¹ ODI (2022), '[Data Decade: Data Cities](#)'

² ODI (2021), '[Exploring new approaches for sharing data in the built environment](#)'

Introduction

The data is clear. We face a climate and biodiversity emergency.³

Data gathered, curated and analysed by thousands of scientists worldwide has established the greenhouse gas cuts we need over the next decade to keep global temperature rises below 1.5°C. Effective use of data is key to delivering those cuts and doing so in ways that deliver wider environmental, social and economic value.

The built environment contributes around 40% of the UK's total carbon footprint⁴ through a mix of embodied carbon in new construction, and operational carbon used to heat and power existing buildings. Add in the emissions from road and rail transportation, and most emissions are shaped by choices made in the design and operation of our building and infrastructure. The UK Institution of Civil Engineers estimates that, while some progress has been made, we “need to reduce the UK’s annual carbon emissions from infrastructure more than 30% faster than we are doing now”, and although some of the required reductions rely on substantial technological and policy shifts, decarbonisation can also be accelerated by “such mundane measures as better data management”.⁵

Data is a powerful tool. And it is made even more powerful when it is standardised and shared in ways that meet a wide range of user needs. The ODI’s experience over the last 10 years has shown that when organisations take a strategic approach to data, supported by suitable investment, capabilities and vision, data can help solve problems.

Across the built environment sector, there are common concerns about the lack of accessible, reliable and trusted data. Data-enabled approaches for decarbonising the built environment have so far been tactical in nature and reliant on scattered spreadsheets, ad-hoc research projects, proprietary databases and conflicting calculations, leading to a landscape in which targets are hard to both reliably set and measure. Given the recent explosion in AI powered by big data, the Internet of Things, sensor networks and real-time data sources, questions over standardisation, privacy protections and governance can frustrate data sharing and re-use.

³ Built Environment Declares (2021), '[Built Environment Declares Climate and Biodiversity Emergency](#)'

⁴ UKGBC (2019), '[Climate change Mitigation](#)'

⁵ Institute of Civil Engineers (2021), '[State of the Nation 2021 | Six ways for civil engineers to act on climate change](#)'

Meeting climate goals requires transparency and accountability mechanisms. How do governments, businesses and citizens know if society is meeting or exceeding climate change goals? The level of change and complexity across the built and natural world will require transparent reporting based on data where provenance and accuracy is assured over the whole asset life cycle. This will help meet goals, protect asset value and enable companies to compete based on the quality of their work.

Addressing the data foundations of the built environment has significant potential. From helping power AI applications that could reduce the operational carbon footprint of our buildings, to ensuring new infrastructure projects minimise their embodied carbon and helping local communities to invest in measures that reduce their exposure to climate risk, better flows of data can support not just transparency but innovation and collaboration that can lead to new solutions.

Achieving these goals requires strategies for collecting, using and sharing net zero data at business, sectoral, national and global scales. Data at scale has been transforming the retail, banking and media sectors for the past two decades. This process will not only unlock economic growth, but provide critical environmental and social benefits by helping reach net zero.

The concept of a 'net zero data strategy' is still in its infancy. But we do know what the critical components of data strategies are – data infrastructure, governance, ethics, literacy and culture – and there are examples of these from other sectors that can help.

Unless businesses, governments and other organisations genuinely align their net zero and data strategies, we have no hope of putting in place the activities needed to avoid further climate catastrophe.

Why we need net zero data strategies

Businesses need net zero data strategies in order to harness the power of collecting, using and sharing data to help tackle the climate crisis

In today's rapidly evolving digital business landscape, maintaining relevance, competitiveness and innovation is paramount for any organisation. To achieve these goals, a well-defined data strategy is indispensable. It provides businesses with a competitive edge by ensuring that data practices are in line with the overall business strategy and emphasises the significance of not just collecting data but also sharing it to drive success.

Data sharing empowers leaders to optimise operations, explore untapped markets, pioneer groundbreaking services and forge new business models. By harnessing the potential of data sharing, businesses can make significant contributions to tackling global challenges, particularly in sustainability, where achieving net zero has become a principal objective, with public commitment from leadership.

Net zero has emerged as a key challenge for businesses operating in the built environment as they strive to align themselves with society's transition towards a low-carbon world. To thrive, these organisations must integrate their net zero strategies with robust data strategies that inform and support their sustainability initiatives.

There are three main benefits to uniting a net zero strategy with a data strategy: it enhances internal operations and external offerings, driving efficiency and innovation; it builds transparency and trust, establishing credibility and loyalty among stakeholders; and it enables collaborative innovation, fostering partnerships and driving collective progress towards a sustainable future.

In this era of constant change, those embracing the power of net zero data strategy hold the key to unlocking organisational success and a meaningful impact on the world.

Towards ‘data-enabled’ business

A net zero data strategy can enable businesses to use data to drive internal net zero goals, such as more efficient operations and less carbon intensive services

Businesses in all industries must move towards data-enabled business and data-informed strategy. This cultural change is critical for commercial success – data powers decision-making on how to run internal operations, what types of products and services to design, which markets to enter and what channels to use to reach customers.⁶

This is also true for a business’s net zero strategy: to drive low-carbon growth and innovation, businesses need actionable insights informed by real evidence and suitably granular data. Companies can only achieve their net zero targets by understanding their direct and indirect emissions, including up and down their value chain. This requires collation, monitoring and interrogation of robust and consistent data that enables them to see their progress and allows them to compare themselves across the industry.⁷ A net zero data strategy can be instrumental in shifting businesses to decarbonisation by improving energy efficiency and moving to renewable forms of energy, and lowering the operational carbon footprint of themselves and their supply chains.

Operations are not the only area where businesses can significantly decarbonise. Emissions forecasts for service offerings such as construction projects can help companies make choices around inputs, distribution and sales channels that make their products and services more environmentally sound, lowering their embodied carbon footprint. Using emissions data to create services and sharing data about greener services can make these offerings more attractive, improving both the financial and environmental bottom line.⁸

⁶ ODI (2020), [‘Sharing data to create value in the private sector’](#)

⁷ ODI (2020), [‘Case study: The value of sharing data for benchmarking and insights’](#)

⁸ ODI (2020), [‘Case study: The value of sharing data for improving market reach’](#)

There is a clear societal benefit to organisations being more aligned across their net zero, data and business strategies – improving individual organisations' carbon footprints contributes towards broader net zero goals and reduces the risks associated with policy and regulation change for local and national governments. The business benefits that this accrues are also becoming clear: increases in energy efficiency and decreases in waste can reduce costs, while being able to go to market with low-carbon offerings can boost revenue. Being net zero data-driven no longer just makes sense for the environment; it makes good business sense too.

Spotlight: operational and embodied carbon

Two topics critical to decarbonising the built environment sector that bring home the value of using data to improve both operations and service design are operational and embodied carbon.

Operational carbon

Operational carbon refers to the amount of carbon emitted during the operational or in-use phase of a building, including the use, management and maintenance of a product or structure.⁹ Typical energy sources are electricity and natural gas, and occasionally oil, propane and wood. According to the United Nations Environment Programme (UNEP), in 2022 operational energy-related CO₂ emissions for the built environment reached 10 gigatonnes of CO₂ equivalent,¹⁰ roughly 27% of total global emissions.¹¹

Businesses, governments and other organisations employing a net zero data strategy towards operational carbon could help shift the decisions made by commercial firms, policymakers, developers and even consumers towards lower-carbon outcomes. We are in a data-rich age for tackling operational carbon emissions, from in-home smart meters and energy performance certificates (EPCs), to platforms providing at-scale analysis of the carbon footprint of large property portfolios.¹²

⁹ SPOT (2020), '[Embodied vs Operational Carbon](#)'

¹⁰ UNEP (2022), '[CO₂ emissions from buildings and construction hit new high, leaving sector off track to decarbonize by 2050: UN](#)'

¹¹ IEA (2023), '[Global CO₂ emissions rose less than initially feared in 2022 as clean energy growth offset much of the impact of greater coal and oil use](#)'

¹² Parity Projects (no date), '[Our Platform](#)'

There are still challenges to overcome, for example missing or outdated data and barriers to data sharing. However, by taking a more strategic approach towards net zero data, organisations can make the most of what currently exists and be in a better position to demand more. The Data Communications Company (DCC), the licensed monopoly and non-profit organisation in charge of rolling out the smart meter network in Britain, estimates that their use has saved 773,836 tonnes of CO2 emissions to date.¹³

Building management companies with access to smart meter data can use this powerful data feed to inform their net zero data strategy and reduce operational carbon. If the UK's Department for Energy Security and Net Zero and energy regulator Ofgem were to adopt a net zero data strategy for the whole country, we could see the opening up and broader sharing of this valuable data beyond the energy sector, enabling businesses, local authorities and other net zero organisations to use it to power their data strategies too.¹⁴

Case study example: using building data to plan carbon reductions

In 2017, Arup worked with the City of Boston, Massachusetts, US, to develop a classification of 86,000 buildings into 75 distinct 'building energy models'. By calibrating these models with anonymised data from Boston's utility providers, the project explored which combination of policies was most likely to help the city achieve a target of net zero carbon emissions by 2050.¹⁵ The work fed into wider recommendations that called for a mix of new regulatory requirements, upfront funding and workforce training.

¹³ Smart DCC (2023), '[Smart meter statistics and network coverage](#)'

¹⁴ ODI (2022), '[DCC Data for Good: Achieving net zero through smart meter data access](#)'

¹⁵ Arup (no date), '[Carbon Free Boston](#)'

Embodied carbon

Embodied carbon refers to the amount of carbon emitted during the making of a building, including activities such as the extraction of raw materials, manufacture and refinement of materials, transportation, construction, deconstruction and disposal.¹⁶ In 2020, embodied carbon accounted for 11% of total global emissions for the built environment, less than operational carbon, but the World Green Building Council estimates that with the expected increase in construction, by the year 2050 embodied and operational carbon emission levels will be the same.¹⁷

Net zero data strategies, informed by the right data, could enable emissions forecasts for construction projects to become as common as financial forecasts. Much of this data already exists, as several platforms and tools take annotated digital building information models (BIMs) created during the design and construction process and use the data from these to drive life cycle analysis, giving estimates of the embodied carbon for each design or material choice. By leveraging these ‘material passports’ – digital documents listing all the materials that are included in a product or construction during its life cycle – forecasts of an asset’s operational carbon emissions, and the risks of issues such as overheating under future climate change models, can also be generated.¹⁸

Digital twin projects go further, creating a dynamically linked digital representation of built assets intended to exist for the whole life cycle of the structure. In some cases, these are updated with real-time sensor data and can support predictive modelling that can be used to optimise buildings for lower carbon. There is a strong belief that this technological approach can help the built environment tackle climate change,¹⁹ and major investments such as the National Digital Twin Programme in the UK²⁰ and Singapore’s national digital twin²¹ demonstrate its relevance to national governments too.

¹⁶ Arup (no date), [‘Carbon Free Boston’](#)

¹⁷ World Green Business Council (2019), [‘Bringing embodied carbon upfront’](#)

¹⁸ ScienceDirect (2023), [‘The anatomy of a passport for the circular economy: a conceptual definition, vision and structured literature review’](#)

¹⁹ Forbes (2022), [‘Can Digital Twins Drive A Climate Change Agenda?’](#)

²⁰ Digital Twin Hub (no date), [‘National Digital Twin Programme’](#)

²¹ TechInvest (2023), [‘Singapore Land Authority Creates a Nation-scale Digital Twin Accurate to 0.1 Centimetres to Advance Urban Planning’](#)

For companies needing to manage embodied carbon, such as those involved in the design, construction and even demolition of buildings, these advances in data infrastructure for carbon calculation provide the foundation for a net zero data strategy. Governments also have a role to play and can feature digital twins in their net zero data strategies to help reduce embodied carbon emissions.

Case study examples: carbon calculation

In the last few years, several new tools have been launched to streamline carbon calculation. For example, the Institution of Structural Engineers' 'Structural Carbon Tool' is an open-source Microsoft Excel-based estimator²² that gives broad estimates of the carbon impact of different structural designs. OneClickLCA provides a commercial platform to perform building and infrastructure life cycle assessment (LCA), and assess projects against more than 40 different certification schemes.²³ Mott Macdonald's Moata Carbon Portal²⁴ offers integration with Building Information Modeling (BIM) systems to provide its clients with real-time calculations of the carbon cost of building models.

Launched at COP27, Arup's latest solution to support full life cycle carbon accounting is the Zero platform.²⁵ Zero captures data from existing and historical projects to inform future design decisions and allows teams to understand, manage and report carbon emissions on their projects. It provides benchmarks, high-level assessment and detailed assessments, and has been peer-reviewed by a number of expert organisations such as the University of Cambridge, Hong Kong Green Building Council and the Technical University of Munich.

²² The Institution of Structural Engineers (2022), '[The Structural Carbon Tool Version 2](#)'

²³ One Click LCA (2023), '[What is Building Carbon Footprint?](#)'

²⁴ Mott Macdonald (2021), '[Moata Carbon Portal](#)'

²⁵ Arup (2022), '[Arup announces international dataset of whole life carbon emissions for buildings at COP27](#)'

From an internal to an external focus

A net zero data strategy can enable businesses to publish or share data for transparency about carbon emissions and net zero goals

For an organisation to achieve net zero, it must become a data-enabled business. But organisations do not exist in a vacuum; they are part of sectors and industries and are situated in cities, regions and countries.

Standards around transparency and accountability are sharpening and expanding, and markets increasingly want to see clear company performance against net zero targets, as an indicator of trustworthiness and to refine assessments of supply chain emissions. Employees want reassurance that they work for a climate-conscious organisation,²⁶ and customers are likewise more interested in green credentials. A net zero data strategy is more than just using data better; at the heart of it is transparency - to build trust and demonstrate trustworthiness.

To achieve sectoral and national net zero goals, data-enabled businesses must move from only looking internally at how data can improve operations and offerings, to looking externally – seeing data sharing as a means to becoming a more trusted net zero organisation in a wider ecosystem.²⁷

Data and trust are now intertwined, and businesses are increasingly sharing data as a means of demonstrating that they are working to achieve net zero in a trustworthy way.²⁸ Data sharing with regulators and the government is commonplace for businesses working in regulated industries, with climate-related disclosure requirements becoming more widespread in the UK.

²⁶ CNBC (2022), [‘Why tech workers are quitting great jobs at companies like Google to fight climate change’](#)

²⁷ ODI (2021), [‘Data strategy: how an ecosystem approach can help shape your vision’](#)

²⁸ ODI (2021), [‘How your data strategy could build trust in your brand’](#)

Making carbon data and other net zero commitments available openly to potential consumers and partners can help organisations build trust across the broader ecosystem.²⁹ Data-enabled businesses should provide decision-useful climate-related data to policymakers and to other parties in the supply chain that depend on the emissions contribution of the product or service.

Although there is more carbon monitoring and reporting than ever before across businesses, selective reporting is still widespread and a lack of clarity about data provenance or standards leads to a lack of comparability between different organisations. It is not enough for businesses to be open and transparent about their carbon data; for meaningful carbon disclosure, companies have to be open about their emissions accounting processes, and collaborate to adopt common standards.³⁰

This openness and transparency around carbon levels and carbon accounting are important for net zero strategies beyond organisational boundaries and need to be part of every business's data strategy. More open and transparent markets will drive better government policymaking and better product selection by customers, and can also improve business opportunities by helping organisations be more trusted and their products and services more desirable.

Spotlight: transparency

Trustworthy greenhouse gas accounting is central to improved corporate sustainability reporting and to the effective functioning of financial markets to direct built-environment activities towards carbon reduction.³¹ Companies face an increasing number of mandatory and voluntary reporting standards that ask for the accounting of direct emissions of greenhouse gases ('scope 1'), indirect emissions from the generation of purchased energy ('scope 2') and emissions generated within their value chain, both upstream and downstream ('scope 3'),³² alongside wider reporting on biodiversity, social and governance issues.

²⁹ ODI (2020), ['Case study: The value of sharing data to build trust'](#)

³⁰ ODI (2022), ['Tackling greenwashing through data assurance'](#)

³¹ ODI (2021), ['Accelerating progress on tackling the climate crisis through data collaboration'](#)

³² FCA (2022), ['Climate-related reporting requirements'](#)

An increasing number of investors are drawing on company-reported sustainability data to shape their portfolios towards low-carbon futures, and they are concerned about the impact of both climate change and potential regulatory changes in creating ‘stranded assets’ – assets that have suffered from an unexpected or premature loss of value. Greenhouse gas accounting data will also be vital to future carbon tax regimes.

Given these trends, a net zero data strategy for the built environment must include well-designed reporting standards within the emissions reporting data infrastructure. This can incentivise the creation of robust data systems inside firms that not only serve external reporting but also support in-house analysis and decision-making. However, a proliferation of reporting standards, and a limited focus on data infrastructure design, can be barriers to effective reporting and benchmarking. This can undermine the quality of reported data and even incentivise ‘greenwashing’.³³

Transparent reporting should not just be about compliance, but should recognise the potential of shared data for benchmarking and sector-wide learning. For example, shared and structured reporting on project-level data, as opposed to company-level, can support the identification of data-backed targets for new building projects, informing both contractors and commissioners. Data from certification schemes and voluntary data contributed to projects such as the Royal Institute of Chartered Surveyors’ nascent Building Carbon Database,³⁴ which can help practitioners compare the performance of a planned project portfolio with that achieved by peers, supporting discussions about further optimising designs.

The importance of transparency to reaching the global net zero goals is driving widespread economic activity, including changing business models and regulatory regimes, birthing whole new markets, and even rerouting dominant labour trends. A net zero data strategy must have transparency at its centre, driving the identification of the right data infrastructure and collaboration to support it.

³³ ODI (2022), [‘Tackling greenwashing through data assurance’](#)

³⁴ BCIS (2019), [‘RICS Building Carbon Database’](#)

Case study examples: supporting reporting transparency

The Open Footprint Forum,³⁵ hosted by the Open Group and co-chaired by leaders from ERM (Environmental Resources Management) and Shell, is working to develop “a common model for footprint-related data covering all types of emissions, consumptions (e.g., water, land, energy), and base calculations to normalize and aggregate data” implemented through an open-source based reference software stack.

The Carbon Call is a ClimateWorks Foundation-hosted initiative mobilising collective action, investment and resources to accelerate solutions to better discover, share and understand greenhouse gas (GHG) emissions data. It builds on, promotes and helps accelerate ongoing work to improve measurement, reporting and verification of GHG emissions and removal, primarily for the corporate sector.³⁶

³⁵ The Open Group (no date), '[Open Footprint Forum](#)'

³⁶ The Carbon Call (2022), '[The Roadmap to More Interoperable Greenhouse Gas Emissions Accounting](#)'

From transparency to open innovation

A net zero data strategy can enable businesses to collaborate with others around innovative approaches to achieve net zero ambitions

In mature data ecosystems, data strategies evolve beyond the vision to use data internally, or only externally for reporting and transparency. In the banking sector, Open Banking has brought seismic change, and a sector once most noted for its digital staidness has built a nation-leading data sharing ecosystem delivering hundreds of new businesses and services to customers.³⁷ In the energy sector, Open Energy and Open Net Zero are providing a data-sharing fabric for the industry,³⁸ and greater interoperability is being called for by government, industry and civil society.³⁹

These mature data strategies foreground the benefits that can come from data collaboration and open innovation among stakeholders such as supply chain partners and even competitors. Actionable insights from data, in addition to transparency and openness, can lead to scalable data access that stimulates innovation, illustrates trustworthiness and facilitates a more open market economy.

Our research shows that businesses are becoming increasingly aware that sharing data in different ways can help them achieve their business objectives, such as increasing market reach, improving efficiencies and optimising supply chains.⁴⁰

³⁷ Open Banking (2022), '[Open Banking Impact Report June 2022 – key insights on adoption and business use](#)'

³⁸ Icebreaker One (2022), '[Open Net Zero \(ONZ\)](#)'

³⁹ Energy Systems Catapult (2022), '[Delivering a Digitalised Energy System](#)'

⁴⁰ ODI (2020), '[Case study: The value of sharing data in supply chain optimisation](#)'

Similarly, data sharing beyond carbon reporting can help businesses achieve their net zero objectives too, reducing carbon footprints along supply chains and collaborating to deliver renewable energy solutions.⁴¹ This is particularly important to small business and emerging markets that may not have the resources to build databases but need the data to be able to influence better outcomes; something currently being targeted by the Perseus programme led by Bankers for Net Zero (B4NZ) and Icebreaker One.⁴²

Historically, data sharing has occurred primarily through bilateral data sharing agreements. However, for businesses to share data, innovate collaboratively at scale, and do so in a trustworthy manner, there needs to be a market architecture to facilitate this. Sometimes this can be achieved with data pooling through data institutions, where common technical platforms or analysis and use of data across multiple organisations are needed.⁴³ Examples include the shipping industry and the pooling of safety data for benchmarking and insights.

However, given the size and scale of the problem, there will also need to be decentralised data publishing – industry-wide collaborations publishing or sharing data directly using open standards or via an open licence, such as in Open Banking.⁴⁴ These decentralised initiatives should be used to build data infrastructure when access to the same data from many sources is needed in a more loosely collaborative way than if it is collected by a central institution.⁴⁵ Centralising data can also reduce data duplication, reducing the carbon footprint of data storage and computing. Businesses with mature net zero data strategies will focus not only on internal processes or transparency, but also on how their companies plug into this data infrastructure – the facilitating standards, policies and platforms.

⁴¹ ODI (2020), '[Case study: The value of sharing data to address sector challenges](#)'

⁴² Icebreaker One (2023), '[Perseus – a multi-sector collaboration to automate GHG reporting](#)'

⁴³ ODI (2021), '[What are data institutions and why are they important?](#)'

⁴⁴ ODI (2020), '[Comparing decentralised data publishing initiatives](#)'

⁴⁵ ODI (2021), '[Exploring new approaches for sharing data in the built environment](#)'

This type of net zero data strategy, conscious of the net zero opportunities of open innovation, has the most significant benefits

for both society and business. Data collaboration at this scale facilitates geographical and sectoral initiatives to reduce the carbon footprint of regions and supply chains. Creating new data-enabled partnerships can reduce costs by using a shared data infrastructure and power new services to bring to market, such as with the Skywise data platform by Airbus,⁴⁶ transport systems using public transport schedules to optimise route-finding, or the myriad of new propositions created across the Open Banking ecosystem.

Net zero data strategies can enable built environment organisations to explore collaboration across a sector, geography or problem space to design and deliver scalable net zero solutions.

Spotlight: resilience

Much of what has been discussed so far falls under the definition of climate change mitigation – efforts to reduce or prevent the emission of greenhouse gases through such means as new technologies, practices, behaviours and renewable energies.⁴⁷ But even with action to reduce emissions, the built environment will have to change along with the climate; a process known as climate change adaptation.⁴⁸

Data is vital to understanding and increasing the resilience of buildings and infrastructure, and a net zero data strategy can help leverage the right tools, collaboration and research for this to be successful.

For example, the Climate Just mapping tool draws upon multiple public datasets to provide localised assessments of populations vulnerable to flooding, household overheating or fuel poverty, as climate change impacts hit.⁴⁹ University College London used the tool to explore overheating risk in care homes, mapping care home locations and exploring the interaction of urban heat islands, population age and building characteristics.⁵⁰ Data-enabled research such as this can inform short- and long-term campaigning and planning to avoid climate harm disproportionately affecting the most vulnerable.

⁴⁶ Airbus (2017), '[Airbus launches Skywise – aviation's open data platform](#)'

⁴⁷ UNEP (no date), '[Mitigation](#)'

⁴⁸ UNEP (no date), '[Climate adaptation](#)'

⁴⁹ ClimateJust (no date), '[Map tool](#)'

⁵⁰ UCL Institute for Environmental Design and Engineering (2018), '[Mapping heat vulnerability in London](#)'

A net zero data strategy could be leveraged to prioritise the use of smart systems that are able to respond to greater pressure on energy grids by adapting demand and power supply. Adopting open standards for data communication within smart buildings, whether closed, shared or open, is vital to avoiding dependence on individual service providers, maximising the value of the data generated, and ensuring smart features remain interoperable as technology develops. US-based Project Haystack, which seeks to “standardize semantic data models and web services with the goal of making it easier to unlock value from the vast quantity of data being generated by the smart devices that permeate our homes, buildings, factories, and cities”, responds to this challenge by providing a set of agreed taxonomies that can be used to provide compatible datasets and API endpoints for building systems such as lighting, heating and air conditioning.⁵¹

A net zero data strategy in the built environment can promote the use of small, standardised and decentralised data sources over highly centralised and high energy use data centres. This can help put individuals and communities in control of charting a low-carbon future, enabling the combination of local skills and knowledge with data-derived insight.

Case study example: Open Data for Resilience

Since 2011, the Open Data for Resilience Initiative, run by the Global Facility for Disaster Reduction and Recovery, has been encouraging greater sharing, collection and use of data for resilience and disaster response, with an emphasis on geospatial data. The project field guide explores how to bring together multiple stakeholders from governments, universities, civil society and private sector organisations to collaborate in building an open data ecosystem. As the guide describes, “OpenDRI catalyzes a change to mindset: it builds a community of practitioners who apply open data to their daily problems, and in so doing, creates a sustainable ecosystem around a living and growing corpus of data that describe a dynamic society”.⁵²

⁵¹ Project Haystack (no date), ‘[Project Haystack](#)’

⁵² Open DRI (2014), ‘[Open Data for Resilience Initiative: Field Guide](#)’

Towards implementing net zero data strategies

Leveraging the right data, at the necessary granularity, speed and scale in the built environment is essential if we are to avoid further climate catastrophe. To ensure this data is available and used correctly, organisations need net zero data strategies.

A unified and strategic approach to net zero and data ensures this use of data is holistic and continuous, not opportunistic and uncoordinated. This means focusing on: strong data infrastructure; robust data governance; embedding data ethics; developing skills and data literacy; and a cultural shift across organisations and the sector as a whole.

This section explores these five critical components of a powerful data strategy and demonstrates how they underpin net zero activities, with examples of organisations showing the power of this strategic approach.

Building and maintaining data infrastructure

Data infrastructure consists of data assets supported by people, processes and technology.⁵³ The data assets at the heart of any given infrastructure vary. They include technical schemas for data exchange; metadata registries for locating relevant data; data lakes and processing environments designed for specialised datasets; and core reference data and identifier lists provided via APIs and downloads to improve interoperability.

Building and maintaining robust data infrastructure lays the foundation for better embedding of net zero data strategies and encompasses effectively managing data assets, standards, technologies, guidance and policies.

⁵³ ODI (no date), '[Data infrastructure](#)'

Data assets and technologies

Data assets and technologies form a fundamental part of data infrastructure. They can be used to measure, evaluate and act upon data in ways that make it easier to progress towards net zero. Corporate sustainability data is more frequently being collected using new collection methods, including surveys, web scraping and accessing publicly available data portals. Increasingly sophisticated analysis and insight are being achieved through machine learning techniques such as natural language processing.

Making data and data infrastructure more available is a vital part of many organisational net zero data strategies. Organisations designed around this approach lead the way. Open Climate Fix publishes open energy data and provides open solar forecasting software to organisations like National Grid as part of its data strategy.⁵⁴ Radiant Earth makes ‘data products’ more available through initiatives like Source Cooperative, the Cloud-Native Geospatial Foundation and Radiant MLHub.⁵⁵ But organisations set up before the digital era are also embracing this vision, with UK Power Networks’ open data portal making one of the UK’s biggest sets of information about the electricity network openly available.⁵⁶ Thames Water recently published a map and accompanying API of all storm discharges across its catchment area.⁵⁷

Data assets also include registers and identifiers. The Legal Entity Identifier (LEI) is an alpha-numeric code based on a standard developed by the International Organization for Standardization (ISO). End users access the LEI Repository via an open data licence.

⁵⁴ Open Climate Fix (2022), ‘[Open Energy Data](#)’

⁵⁵ Radiant Earth (2023), ‘[Radiant Earth Announces New Initiatives to Accelerate Sharing of Earth Science Data](#)’

⁵⁶ UK Power Networks (2021), ‘[Open Data Portal](#)’

⁵⁷ Thames Water (2023), ‘[EDM Map](#)’

Case study: the Amazon Sustainability Data Initiative open-data catalogue⁵⁸

The Amazon Sustainability Data Initiative (ASDI) is a programme that seeks to significantly reduce the cost, time and technical barriers associated with analysing large datasets to generate sustainability insights. A collaboration between the Global Legal Entity Identifier Foundation (GLEIF), OSClimate and Amazon has resulted in GLEIF's real-time open LEI datasets being made publicly available for the first time in the cloud, via the ASDI data catalogue.

ASDI's hosting capabilities simplify programmatic access to the LEI data, which connects unique entity identifiers to verified business reference data, enabling clear and unique identification of legal entities participating in financial transactions. OS-Climate ingests and transforms this raw data into its Data Commons platform, which provides a streamlined architecture for building, sharing and running data and analytics services for evaluating climate finance risks and opportunities, benefiting from significant efficiencies by doing so.

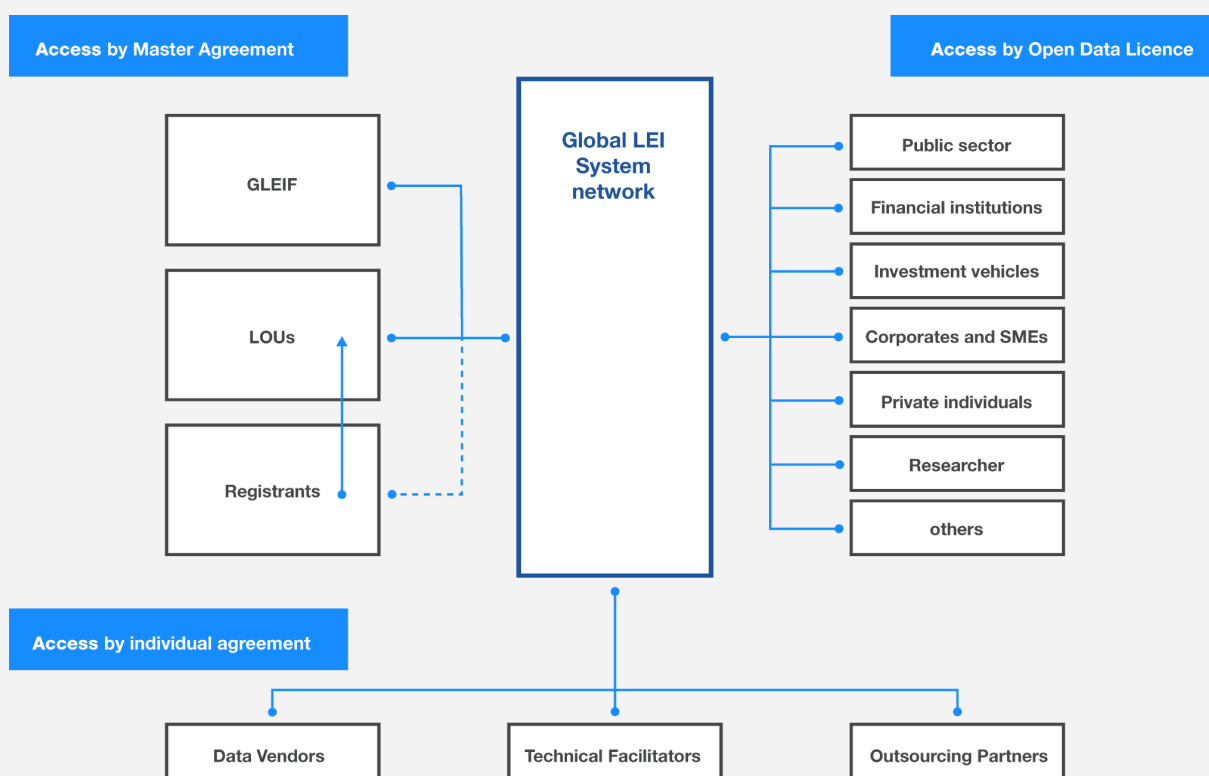


Figure 2: the Global LEI System as a Legal Network (Source: [GLEIF.org](https://www.gleif.org))

⁵⁸ GLEIF (2022), 'How LEI datasets can enhance global sustainability initiatives and climate-aligned finance'

LEI data helps businesses assess the climate change-related risks of their investments. Making this data available alongside other relevant datasets in the cloud, together with access to computational capabilities, can help streamline the risk assessment process.

Impact

By making large sustainability datasets publicly available to anyone, ASDI seeks to accelerate sustainability research and innovation by minimising the cost and time required for data acquisition and analysis. The datasets can also be easily accessed by, and integrated with, other sustainability initiatives, to enhance data modelling, mapping and calculations.

Data standards

Data standards can enable better data exchange within and between organisations using common formats and shared rules. Standards can also provide guidance and recommendations for sharing better quality data and understanding processes and the flow of information.

A data standard is a reusable agreement which helps to steward data more consistently. Data standards have several benefits if widely adopted. They can help people to adopt the same vocabulary and language and use common attributes, definitions and models.⁵⁹ Open standards for data are reusable agreements that make it easier for people and organisations to publish, access, share and use better quality data.

Standards for data are not just file formats, taxonomies and schemas.

Often, initiatives need help to overcome simple barriers, such as language and working methods, when they engage in multi-stakeholder collaboration. When adopting and creating standards with stakeholders, organisations should explore more than just technical standards. Agreeing to adopt data standards helps to steward data more consistently, and there are some good examples of this being used to address climate change.

Since 2013, the Open Contracting Partnership has been working to develop a global data infrastructure to enable transparent and effective public procurement and support its adaptation and adoption in different sectors and countries.⁶⁰ At the heart of the open contracting data infrastructure is the Open Contracting Data Standard (OCDS), a data specification that describes how to represent each stage of public procurement processes as structured data, which makes it easier for those in the procurement process to trace potential environmental impacts relating to the delivery of goods, works or services.⁶¹ Before introducing the standard, it often took a lot of work to gather together data on what governments planned to buy, what they tendered for, the contract awards made, and the final delivery of goods, works or services.

Building on a design process that considered private sector, public sector and civil society use cases for procurement data, OCDS introduced the idea of a common identifier to tie together stages of procurement and set out key data fields that existing systems should map to. The first proof-of-concept prototype was built in just 10 days, followed by a year-long series of development sprints commissioned by the World Bank, each delivering an iteration of a prototype for comment and feedback.

⁵⁹ ODI (2018), '[Announcing the open standards for data guidebook](#)'

⁶⁰ Open Contracting Partnership (2023), '[About us](#)'

⁶¹ Open Contracting Partnership (2023), '[The Open Contracting Data Standard](#)'

Case study: ‘Follow the Water’ and the OCDS⁶²

The Follow the Water Project used the OCDS to evaluate the cost-effectiveness of flood management in Taiwan, helping investigate whether contractors applied the optimal construction methods to manage water resources and control floods. A social innovation hackathon organised by the Presidential Office of Taiwan to seek solutions to societal problems through open data provided the perfect springboard to dive into the data.

A team of computer engineers, data scientists, civil engineering researchers and journalists worked together to understand flood patterns, identify flood causes, examine government procurement patterns, compare flood hotspots with construction project values and locations, measure the suitability of these projects and evaluate their cost-effectiveness.

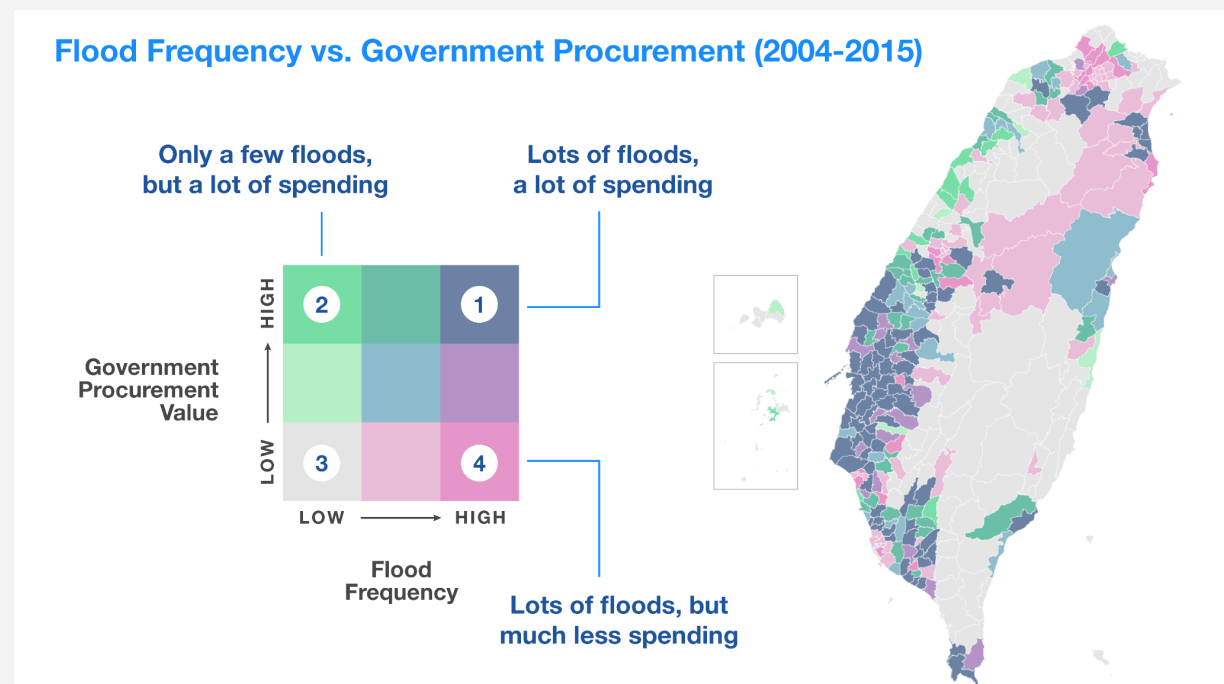


Figure 4: Flood Frequency vs. Government Procurement (2004-2015) (Source: open-contracting.org)

The team created a heatmap of flood frequency v procurement spending to analyse patterns and draw conclusions that could

⁶² Open Contracting Partnership (2018), [‘Follow the water: Using open contracting data to evaluate the cost-effectiveness of flood management in Taiwan’](#)

help Taiwanese planners, and policymakers evaluate their own decision-making regarding particular investments in the built environment to combat flooding in the country.

Impact

The team identified three types of patterns that require further investigation:

- areas with lots of floods and a lot of spending – prompting planners to analyse the effectiveness of the construction efforts in these areas;
- areas with few floods and a lot of spending – prompting planners to analyse the rationale of the construction efforts in these areas;
- areas with lots of floods and little spending – prompting planners to analyse the rationale of the lack of investment in these areas.

This project is the first time that a data-driven approach has been applied to water resource management in Taiwan, as opposed to civil or environmental engineering methods. It provided Taiwanese stakeholders with new and valuable approaches to flood management and prevention going forward.

Organisations

Organisations such as Microsoft are at the forefront of developing and maintaining data infrastructure as part of their net zero strategies.

For example, its Planetary Computer Data Catalog includes huge amounts of environmental monitoring data in consistent, analysis-ready formats.

Case study: Microsoft Planetary Computer⁶³

The **Microsoft Planetary Computer** is a proprietary platform that lets users leverage cloud services to enable environmental sustainability and Earth science programmes.

The Planetary Computer consists of four major components:

- The Data Catalog, which contains petabytes of data about Earth systems such as biodiversity, solar and water, is hosted on the Microsoft Azure cloud platform and is made openly available to users.
- Open APIs, such as STAC API, that allow users to search for relevant data across the catalogue and integrate the data into their projects.
- The Planetary Computer Hub, a development environment that makes data and APIs accessible through open-source tools, allowing users to process massive geospatial datasets.
- Numerous applications, built by Microsoft's network of partners, provide services such as monitoring forest change, mapping land use and building environmental risk models.

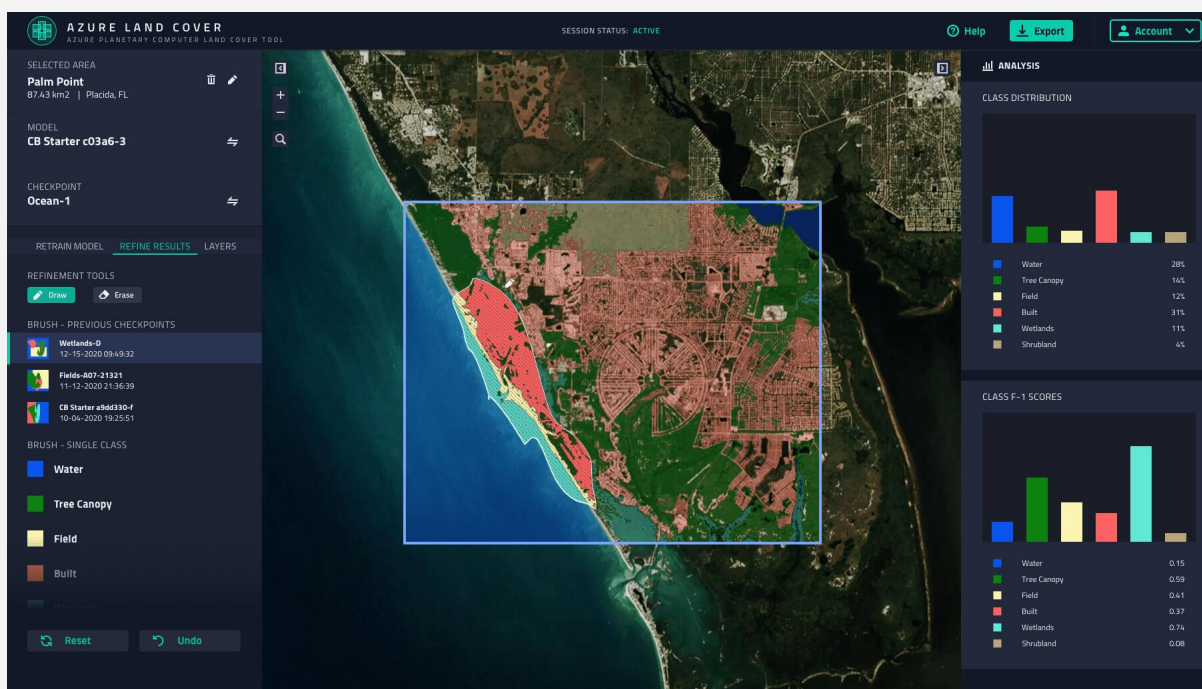


Figure 5: AI-Accelerated Land Cover Mapping (Source: microsoft.com)

⁶³ Microsoft (2020), 'Planetary Computer'

Impact

The Planetary Computer supports several Earth science projects to achieve their goals. Some of these outputs include freely accessible analysis-ready imagery; newer, faster and more effective risk management strategies; near real-time decision-making to respond to changes in ecosystems or other natural environments; and integration of cloud-based, large-volume image processing.

A critical element for the success of net zero data strategies

is developing and collaborating with data institutions in order to improve access to data. Data institutions are organisations that steward data on behalf of others, often towards public, educational or charitable aims.⁶⁴ Stewarding data is the activity in data's life cycle or value chain – collecting, maintaining and sharing it.

Initiatives like Open Net Zero⁶⁵ and Stream⁶⁶ are data institutions that steward data on behalf of other organisations and communities in order to deliver benefits to the environment. These net zero data institutions represent the closest alignment of data and net zero strategies, and although most companies do not need this level of agreement, they can inspire less data-centric or environmentally focused organisations.

Open Net Zero and Stream have been designed as data institutions, but there are a number of organisations in the built environment sector that already exist and could perform the role of data institutions in their relevant areas. For example, Ordnance Survey (OS) plays a key role in stewarding AddressBase and the Unique Property Reference Number (UPRN) identifier,⁶⁷ while Ofgem's data portal provides access to a range of interactive data charts on the gas and electricity sectors in Great Britain.⁶⁸

Data institutions at the heart of the 'green retrofitting' data ecosystem include TrustMark and the Microgeneration Certification Scheme (MCS) Service Company. TrustMark is a not-for-profit social enterprise that licences and audits more than 35 scheme providers with more than 15,000 registered businesses and stewards the TrustMark Framework Operating Requirements.⁶⁹ MCS defines, maintains and improves quality in the ecosystem by certifying low-carbon energy technologies and contractors.⁷⁰ The MCS Installations Database is a central online database that holds the information of every MCS-certified, small-scale, low-carbon installation in the UK since 2010.⁷¹

⁶⁴ ODI (2021), '[What are data institutions and why are they important?](#)'

⁶⁵ Icebreaker One/Open Net Zero (2023), '[Net Zero data at your fingertips](#)'

⁶⁶ ODI (2023), '[Enabling innovation across the water sector with Stream](#)'

⁶⁷ Ordnance Survey (2023), '[AddressBase](#)'

⁶⁸ Ofgem (no date), '[Data Portal](#)'

⁶⁹ TrustMark (2022), '[Who is TrustMark?](#)'

⁷⁰ MCS (2023), '[About us](#)'

⁷¹ MCS (2023), '[The MCS Installations Database](#)'

Case study: Stream⁷²

Stream is a sector-wide initiative enabling a scalable, repeatable approach to open data in the UK water industry. Stream's vision is to unlock the potential of water data to benefit customers, society and the environment. Stream aims to benefit the water sector and beyond by establishing a widely accessible open data platform.

Working as a collective of 11 water companies and six partner organisations, Stream has already worked through phases to define the strategy and co-create an open data framework for the sector, with the goal of tackling key sector challenges such as:

- preventing environmental incidents;
- reducing absolute carbon emissions associated with water extraction, use and treatment;
- bringing down the cost of water, particularly for the most vulnerable customers;
- catalysing innovation and new ways of working across the sector;
- enabling people to do more exciting, meaningful work.

Collaboration to solve sector-wide challenges and explore the solutions and opportunities that open data might provide indicates that the companies involved in Stream are increasing their open data maturity and considering how open data's benefits can best be unlocked.

Impact

Once the initial open data platform phase is complete, Stream will transition to an independent data institution, with plans to provide secure data sharing and data analysis services on top of its core purpose as an industry open data platform.

⁷² MCS (2023), '[The MCS Installations Database](#)'

Setting the right data governance

Data Management Association (DAMA) International defines data governance as the exercise of authority and control (planning, monitoring and enforcement) over the management of data assets.⁷³ Where senior leaders can exercise authority and create organisational alignment between net zero goals and the strategic management of data, they can set the tone for robust data governance in implementing net zero data strategies. Data governance enables transparency and insight into the costs to the environment of managing data and ensures these are managed in a sustainable way.

Net zero data governance can align to the principles, policies and practices that are implemented to ensure the collection, processing, storage and use of data achieve net zero carbon emissions. It also involves managing and minimising the environmental impact of data operations, infrastructure and analytics.

Effective data governance involves managing data across the entire data life cycle, from collection to disposal. Net zero data governance could extend this approach by ensuring that each stage of the data life cycle is environmentally responsible. This includes evaluating the carbon footprint of data storage, transmission and processing, and seeking ways to optimise energy use and reduce emissions.

A central issue might be that data centres and server farms consume significant energy. Net zero data governance could prioritise energy-efficient infrastructure design, including efficient cooling systems, optimised hardware configurations, renewable energy sourcing, and further novel approaches.⁷⁴

Further to decarbonising data storage, net zero data governance could encourage organisations to minimise unnecessary data collection, processing and storage. By reducing the amount of data collected and stored, organisations can decrease the energy required for processing and storage, lowering their carbon footprint.⁷⁵

⁷³ DAMA. Earley, S., & Henderson, D., Sebastian-Coleman, L (Eds.). The DAMA Guide to the Data Management Body of Knowledge (DAMA-DM BOK). Bradley Beach, NJ: Technics Publications, LLC. 2017.

⁷⁴ Popular Science (2023), '[This startup wants to use heat from data centers to warm swimming pools](#)'

⁷⁵ Jackson, T.W. and Hodgkinson, I.R. (2022), '[Keeping a lower profile: how firms can reduce their digital carbon footprints](#)', Journal of Business Strategy, Vol. ahead-of-print No. ahead-of-print.

Net zero data governance could benefit from collaboration among organisations, policymakers and industry stakeholders; sharing best practices, developing industry standards and engaging in collective efforts to help accelerate the adoption of sustainable data practices. Collaborative initiatives may include data and knowledge sharing, joint research and industry benchmarks for reducing the carbon footprint of data operations.

Case study: The Standard for Environmental Risk and Insurance (SERI) Governance Framework⁷⁶

The Standard for Environmental Risk and Insurance (SERI) Governance Framework by Icebreaker One proposes creating a secured shared data governance framework that brings together all valuable insurance-related data, with the support of industrial partners and advisory groups in the insurance value chain. It can unlock the insurance industry's potential to play a critical role in the transition to net zero.

The governance framework would facilitate data sharing to encourage collaboration and innovation towards industry-wide net zero goals through the promotion of new incentives and levers of change in automated reporting, validation and more. Strong data governance explicitly connected to net zero goals would underpin successful net zero strategies.

⁷⁶ Icebreaker One (2021), [‘The Standard for Environmental Risk and Insurance \(SERI\) Governance Framework’](#)

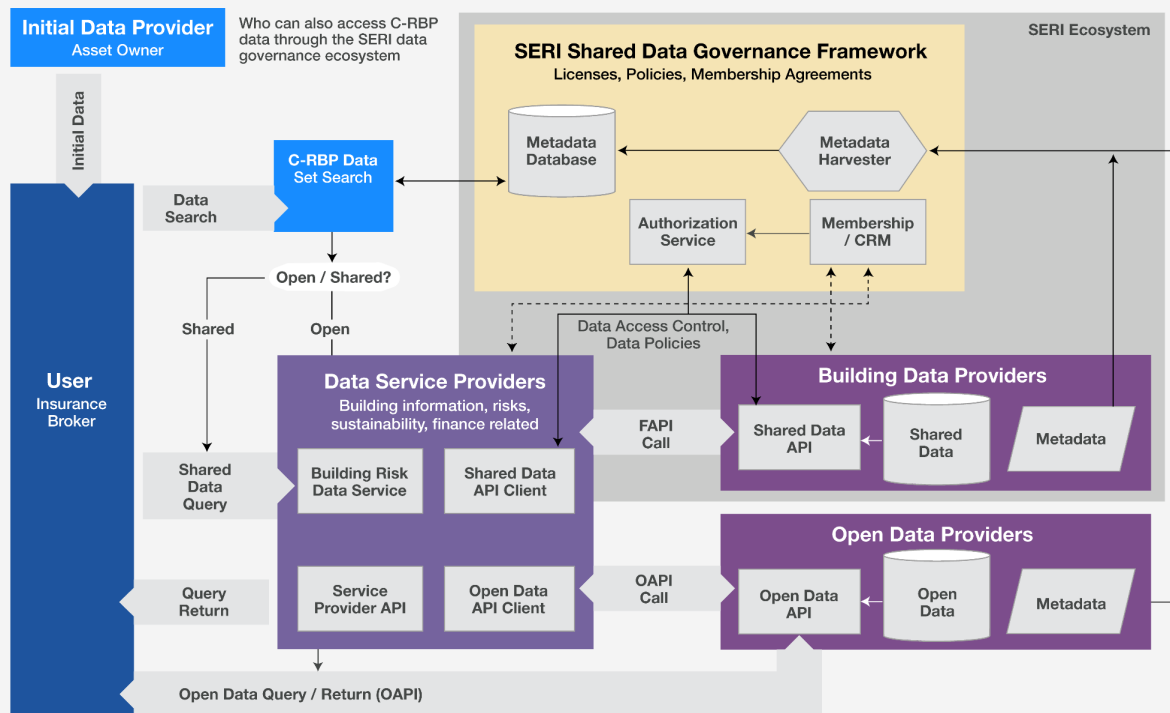


Figure 8: SERI Shared Data Infrastructure - A Broker's view from the Climate-Ready Building Passport Data Service (Source: icebreakerone.org)

The governance framework would facilitate data sharing to encourage collaboration and innovation towards industry-wide net zero goals through the promotion of new incentives and levers of change in automated reporting, validation and more. Strong data governance explicitly connected to net zero goals would underpin successful net zero strategies.

Impact

The proposed solution of a SERI sharing governance framework leverages the experience of existing open data infrastructure initiatives such as Open Banking and Open Energy. The pilot brought together organisations from across the energy, built environment and insurance sectors to discuss a Climate-Ready Building Passport case study; however, a sustainable solution has not yet been created.⁷⁷

⁷⁷ IcebreakerOne (2021), 'Report — Envisioning SERI's Regulatory and Data Sharing Framework'

Embedding data ethics

Data ethics is the evaluation of data practices that have the potential to adversely impact people and society. Data ethics relates to good practices around how data is collected, used and shared. Data strategies must have data ethics embedded within them to ensure net zero strategies do not replicate or exacerbate existing biases.

Operationalising data ethics is a necessary consideration in implementing net zero data strategies. This means balancing the need to generate, extract and derive value from data with the potential consequences of doing so. Ethical risks identified in the use of data and data-driven technologies are not exclusive to the net zero context but deserve additional caution because of the scale of deployment and the risk of increasing inequality.⁷⁸

Common discourse in the net zero data ethics space tends to focus on the risk of increasing inequality by applying net zero strategies and initiatives. For example, initial investments in green infrastructure like electric vehicle (EV) charging stations have tended to focus on affluent areas, increasing environmental disparity,⁷⁹ though efforts are being made to combat this.⁸⁰

Case study: Energy Systems Catapult⁸¹

A Smart Local Energy System (SLES) is an approach to coordinating the energy assets and infrastructure of a local area and to use data, technology and automation to improve their operation and collaboration. Proponents of SLESs believe they can deliver value for local authorities and communities by supporting local carbon targets more quickly and more cost effectively.

In their paper, 'Data Ethics and Bias: Practical Steps to Avoid Discrimination in Future Smart Local Energy Systems', the Energy Systems Catapult (ESC) proposes a set of principles to prevent structural data bias from entering the data that underpins these new energy products and services.

⁷⁸ UCL (2022), '[Data Ethics & Governance: Towards UK Net Zero 2050](#)'

⁷⁹ Science Direct (2022), '[Examining spatial disparities in electric vehicle charging station placements using machine learning](#)'

⁸⁰ ConnectedKerb (2021), '[Game-changing EV charging project in Lambeth addresses EV inequality](#)'

⁸¹ Energy Systems Catapult (2022), '[Data ethics and bias: practical steps to avoid discrimination in future smart local energy systems](#)'

The principles described in the report are:

- user group principles to identify groups that may be adversely affected by data bias;
- user effect principles which demonstrate how users can be affected by data bias;
- data mitigation principles which give a set of ways in which data bias can be mitigated.

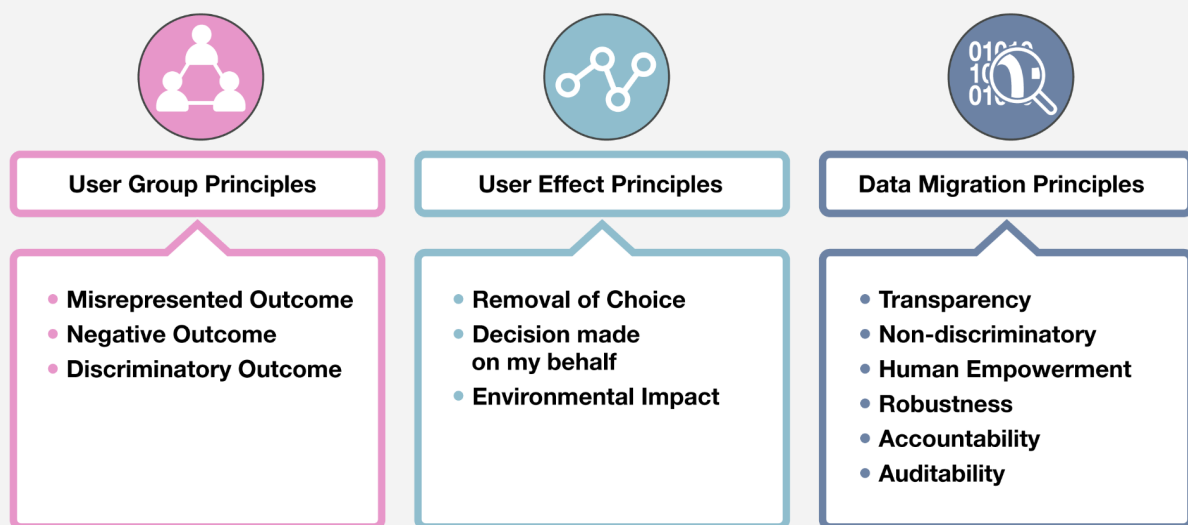


Figure 10: Summary of the principles which will be outlined in this report (Source: es.catapult.org.uk)

Impact

Business models are still emergent for SLES, from value intermediaries like project marketplaces, local energy markets and local flexibility markets, to value providers like virtual network managers and anchor assets. Monitoring the application of these principles as SLESs scale up will be paramount to understanding their success.

Improving data literacy

Data literacy is the ability to think critically about data in different contexts and examine the impact of different approaches when collecting, using and sharing data and information.⁸² Developing data literacy is a critical component of data strategy – businesses with formal data literacy plans are in the top 20% performing companies by return on sales.⁸³

Data literacy is relevant in every industry. More than technical skills, data literacy includes the ability to evaluate the impact of bias and limited sampling, examine different ways of data collection, and compare and contrast how different organisations use data to convey important messages on topics such as climate change.⁸⁴ Net zero data literacy can help organisations understand how to navigate the data infrastructure of the nascent, fragmented and growing net zero data ecosystem.

A net zero data strategy means providing data literacy and net zero literacy training within an organisation's skills and learning function. A lack of data skills, engagement and data literacy will limit the successful implementation of a net zero data strategy.

Net zero data strategies need to promote a balance between technical and non-technical skills to ensure that individuals and organisations can make an impact with data and help ensure the best outcomes. For example, technical skills can allow built environment organisations to understand the operational and embodied carbon levels their activities generate. But non-technical skills are needed to understand the impact that will have on their business and the community in which they operate, and how new data collaboration and innovation approaches can help them to hit their net zero targets.

⁸² ODI (2021), '[Data literacy: what is it and how do we address it at the ODI?](#)'

⁸³ ODI (2020), '[The Data Skills Framework: connect data literacy to business strategy](#)'

⁸⁴ ODI (2022), '[Data literacy and the UK government](#)'

Case study: The Carbon Literacy Project⁸⁵

Carbon literacy refers to the knowledge and capacity required to create a positive shift in how people live, work and behave in response to climate change, and is an example of the new competencies needed for the implementation of net zero data strategies. Being carbon literate involves strong data literacy across organisations in order not just to monitor and calculate activity carbon footprint contribution through data, but also to analyse and develop strategies for improvement.

The Carbon Literacy Project offers carbon literacy training and advice on climate change, carbon footprints and how people and businesses can play a part in achieving net zero emissions. Carbon literacy training is offered through workplaces, educational institutions and communities. The project can accredit organisations as ‘Carbon Literate Organisations’.

Impact

According to the project, carbon literate citizens typically realise carbon savings of 5-15% per person. They have calculated that with more than 59,000 citizens certified and 175 organisations accredited as being carbon literate, more than 213k tonnes of CO₂e have been saved through the project.

⁸⁵ The Carbon Literacy Project, [‘What On Earth Is Carbon Literacy?’](#)

Embracing data culture

A common refrain in the business community, “culture eats strategy for breakfast⁸⁶”, points to a widely accepted view that without an organisational culture that reflects, supports and enables a defined strategy, that strategy is likely to fail. It is also a critical consideration in developing net zero data strategies. Yet it is the most difficult area to find current literature and case studies to draw on.

A data culture is characterised by a strong focus on data and analytics, thought leadership, and a commitment to using data and information to inform and drive business decisions. Although a definition of a ‘net zero data culture’ does not yet exist, embracing a data culture can help an organisation improve its net zero strategy by providing a foundation for evidence-based decision-making and continuous improvement.

Embedding a data culture is most effective and impactful when there is a compelling corporate vision for how data drives business value and is aligned with the overall strategic objectives. The vision should motivate employees to use data in their work, empower stakeholders in their understanding of the business and help leaders with evidence-based decision-making.

In turn, this vision can encourage employees to use data and analytics to identify opportunities for reducing greenhouse gas emissions, increase energy efficiency and transition to renewable energy sources. This can help organisations develop and implement more effective and sustainable net zero strategies, and ultimately contribute to the fight against climate change.

For built environment firms that are used to solving their data problems alone or with off-the-shelf products, moving to a world in which they can draw on data as a shared or common resource for net zero-focused problem solving can involve considerable culture change, not to mention new skills and working practices. Accelerating this cultural change will take dedicated focus.

We see signs that organisations are acting in ways that might be expected in what could be called a ‘net zero data culture’. In some cases, organisations are collaborating with others, especially competitors, to use data to solve net zero challenges, without a clear view of how that will improve the bottom line. In other words, the carbon benefits are apparently being seen as just as strategically important – if not more so – as the bottom-line benefits.

⁸⁶ Management Centre (2023), [‘Culture eats strategy for breakfast’](#)

Case study: Industry Data for Society Partnership⁸⁷

The Industry Data for Society Partnership (IDSP) was created by a consortium of private sector organisations (including Microsoft, UK Power Networks, Northumbrian Water Group, HPE, Github and LinkedIn) to make private sector data more open and accessible in order to address societal challenges, with a particular focus on net zero.

The partnership serves as a channel for the private sector to drive attention to the importance of data sharing and collaboration to help society and serves as a forum to foster connections between industry and the public sector, researchers and academics.

One of the partnership's first projects was to launch the Data for Local Environments Challenge, an open data challenge led by the ODI and supported by the partnership organisations.

Using publicly available datasets and datasets shared or curated by the private sector, participants explored how officials in cities, counties and municipalities can use these datasets to generate insights and solutions to improve their local environments, such as reaching their net zero goals.

Impact

The new partnership has helped encourage commitments to more open data publishing and voluntary collaboration across the private sector. The Data for Local Environments Challenge garnered significant participation and enthusiasm, leading to winning submissions receiving \$100k (US dollars) to implement their open data- and open source-enabled projects.

We are at the beginning of a journey to embrace a net zero data culture. Successful collaborations and initiatives can help propel and expand this culture until it is taken for granted in organisations worldwide.

⁸⁷ ODI (2022), '[Industry Data for Society Partnership challenge: Using openly available data to improve local environments](#)'

Summary and next steps

The need for urgent action on climate change is no longer a matter for debate. We need more viable changes that will substantially reduce short- and long-term energy demand. The question for the built environment sector is how to accelerate action to reduce emissions, build for resilience and protect biodiversity. We need to use all the tools at our disposal, including the significant power of data.

In this paper we have reviewed the reasons **why we need carbon data strategies for a net zero economy or 'net zero data strategies'** and have looked at examples of organisations and initiatives showcasing the value of these approaches, highlighting areas of interest for organisations in the built environment. We have set out the case that net zero data strategies can enable businesses to use data to:

- drive internal net zero goals, such as more efficient operations and less carbon intensive services, potentially reducing both operational and embodied carbon;
- publish or share data about carbon emissions and net zero activities, promoting transparency to help achieve collective net zero goals;
- collaborate with others around innovative approaches to achieve net zero ambitions, including how this can specifically support climate resilience.

We have also reviewed the types of actions organisations in the built environment need to take in order to begin **implementing net zero data strategies**. We have identified the need to build and maintain data infrastructure, including data assets, technologies and standards, and to consider the role of data institutions. To this end, we recommend that organisations:

- Take stock of the data about the built environment that they collect, access, use and share, and consider how it could be used to help reach their net zero goals. This could be through generating insights to improve operations, or through collaborating with partners on climate initiatives.
 - ODI tools such as [Data Ecosystem Mapping](#) and the [Value of Data Canvas](#) can help organisations understand the value data can generate for themselves and their stakeholders.

- Adopt common and open standards for data when publishing open data about climate activities, or sharing data as part of a wider initiative.
 - ODI tools such as the [Open Standards for Data Guidebook](#) can help organisations find, adopt and, where necessary, create standards to support better data sharing.
- Identify other organisations that can act as data institutions stewarding data and data infrastructure or as data intermediaries providing data-enabled services, and collaborate with them towards net zero goals.
 - Arup has developed a number of tools to support different aspects of carbon calculation, accounting and reporting, including most recently, the [Zero carbon tracking platform](#).

We have discussed the importance of setting the proper data governance. We recommend that organisations evaluate current data governance principles, policies and practices to ensure the collection, processing, storage and use of data align with achieving net zero carbon emissions. This could include seeking to understand and reduce the carbon footprint of data activities through energy-efficient infrastructure, sustainable data sharing and minimising unnecessary data collection, processing and storage.

- DAMA has created the [Data Management Body of Knowledge \(the DMBok\)](#) to help organisations access global best practices regarding data governance.

We have demonstrated the need to embed data ethics within an organisation's operations. We recommend that organisations review the ethical implications of how they access, use and share data for and about their net zero activities and ambitions, thinking specifically about the climate implications of data activities, and the equitable distribution of the benefits of their net zero activities.

- ODI tools such as [The Data Ethics Canvas](#) and the [Data Ethics Maturity Model](#), as well as [Consequence Scanning](#) by Doteveryone, can help organisations examine the consequences of their data and net zero activities on the climate, relevant communities and wider society, and how to mitigate negative outcomes. They can also provide a way forward to improve organisational maturity in ethics.

We have discussed the benefit of improving data literacy within organisations. We recommend that organisations conduct a learning needs assessment of their own organisations to identify existing gaps in data and carbon literacy that could be holding back their net zero plans, and create a plan to develop a data literacy programme that can address the identified gaps.

- ODI tools such as [The Data Skills Framework](#) can help organisations analyse current approaches to data literacy, identify imbalances of skills, and address gaps in data literacy.

We have explored the possibilities and challenges of embracing a data culture to ensure our net zero data strategies come to life. We recommend that organisational leaders should:

- lead by example – be climate conscious and data-enabled, and evangelise that within the organisation and through external relationships;
- commit to public goals – be open and ambitious about cutting emissions, publishing progress and methodology, and sharing data through publicised collaborations;
- review the organisational landscape – be open to making big changes such as hiring to specific roles, updating the onboarding and training processes, and incentivising data and net zero practices.

Next steps

This paper is exploratory in nature and we do not profess to have all of the answers. However, we believe the conceptual framework of a carbon data strategy for a net zero economy is a useful starting point for organisations to see the inextricable links between better carbon data practices and better net zero outcomes.

This paper is being launched during [London Climate Action Week](#), the annual event that harnesses the power of London for global climate action, where the ODI will be active online and in-person throughout the week.

Join Arup at its interactive session, '[Net Zero Property: Decarbonising Urban Places by Arup](#)', where it will be joined by representatives from the UK government and the property investment and development community to explore how property sector decarbonisation can be accelerated and scaled-up through standardised approaches.

The ODI will continue to work in this space, alongside partners such as Arup, starting with convening our first Net Zero Data Strategy Roundtable in September to discuss how to improve strategic data collaboration in the built environment. We invite others to get involved by contacting us to discuss collaboration, provide feedback on this paper, or share examples of net zero data strategy in practice.