ADViCE Expert Working Group Whitepaper

AI for Decarbonisation: Policy and Regulation Alignment

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The **ADViCE project's mission** is dedicated to advancing innovation in AI to address decarbonisation challenges across four pivotal sectors: Energy, Built Environment, Manufacturing and Agriculture. ADViCE is a £500k project in the DESNZ Net Zero Innovation Portfolio, part of Stream 1 of the Artificial Intelligence for Decarbonisation Innovation Programme.

As part of these efforts, an Expert Working Group (EWG) has been established to contextualise the current opportunities and hurdles in adopting AI solutions for decarbonisation. The EWG engages a diverse array of experts, including sector representatives, startups, regulators, and academics. This white paper series, a main output of the EWG, compiles key observations and recommendations gathered during the sessions built around three themes:

- AI for Decarbonisation Policy and Regulation Alignment
- Unlocking and Enabling Investment and Innovation
- Data Accessibility and Capability

The EWG and the white paper series aim to inform policy and shape the design of future interventions in AI for decarbonisation for DESNZ.

The white paper series synthesises perspectives and themes identified during the EWG meetings, as well as findings from additional research across the project's activities, including the webinar series, the reports, and the programme partners' own expertise.

Policy & Regulation in the context of AI for decarbonisation

Policy and regulation play a crucial role in the successful adoption of AI for decarbonisation, particularly when regulatory uncertainty poses barriers to long-term investments in new technologies. For AI, there is also an inherent tension between deregulation and fast development of AI, and ensuring safe responsible deployment of AI systems. Getting this balance right is crucial to enable the development and adoption of AI for decarbonisation applications.

Artificial intelligence

The newly elected Labour government has signalled a commitment to enabling a policy environment that encourages the deployment of AI solutions for decarbonisation - especially in the energy sector. Aligning AI developments with national priorities and societal values, the government seeks to maintain the pro-innovation regulatory framework set by its predecessor ensuring stability for businesses. Individual sector regulators will continue to develop AI strategies based on five core principles: **Safety, Security and Robustness; Fairness; Transparency and Explainability; Accountability and Governance; and Contestability and Redress.** The government has also announced the creation of a National Data Library to support AI development and grant researchers and academics access to critical public sector data and plans to introduce binding regulations on companies producing the most powerful AI models.

Net Zero targets and clean energy

The energy transition and net zero policy are central to the new government's agenda, with the mission to 'Make Britain a clean energy superpower.'[1] It has set the target to achieve a cheaper, zero-carbon electricity system by 2030, underpinned by major investments in offshore wind, solar power, and nuclear energy.

This strategy involves two newly established bodies: the National Wealth Fund and Great British Energy (GBE). A £2 billion investment in GBE will aim to catalyse both public and private investments in renewable infrastructure, advancing the UK's transition to Net Zero. The National Wealth Fund will aim to crowd-in investment, with a focus on hydrogen production, renewable energy, and the decarbonisation of industrial clusters.

The King's Speech recently confirmed this plan with several bills touching on clean energy, digital information, smart data, cybersecurity and resilience - areas central to ADViCE's mission. However, there are some concerns about the government and regulators' ability to effectively navigate the complexities of AI technologies. This white paper seeks to inform DESNZ on the critical intersection between AI and decarbonisation, exploring its impact on energy use across industry, homes, and data centres, as well as the need for open, interoperable datasets to drive AI innovation/AI model development.

[1] Labour. (2024). Make Britain A Clean Energy Superpower.

Key issues and recommendations

This section reflects the ADViCE EWG's discussions of key issues and recommendations relating to AI policy and regulatory challenges, taking into account the new government commitments and ambitions.

Datasets for public and private benefit

Data sharing remains a complex issue, particularly when forming agreements between organisations, due to high privacy and legal concerns. For instance, it was noted that within the commercial real estate sector, obtaining data about a building's energy use is difficult, although access to such data could support land use planning and energy systems operations. Some progress is being made on opening up real data in various areas, but timelines remain a challenge (especially in the context of national emissions commitments) along with other issues.

As such, EWG members noted growing interest in and use of **AI-generated synthetic data**, especially in sectors where real-world data is either hard to obtain or restricted due to privacy concerns (e.g., smart metres, wind energy and cement production). This is already being explored by public bodies, for example, the FCA has published a report synthetic data for finance-related applications[2] and NHS Digital is currently conducting an artificial data pilot to explore the potential to train scientists and clinicians using artificial data that shares some of the characteristics of real data while protecting patient confidentiality.[3] Alongside Linux Foundation Energy, Centre for Net Zero (an autonomous research institute established by Octopus Energy Group) has established *OpenSynth*, an open-source one-stop-shop for synthetic smart metre data.[4] These examples highlight the need to co-develop and implement a data-sharing infrastructure that incorporates a role for synthetic data.

As well as the governance issues noted above, EWG members also noted challenges associated with accessing funding to support the collection, creation and sharing of datasets that could then be used to catalyse other innovation. Many funding programmes focus on the commercialisation of downstream applications of data (i.e. they assume that the relevant data is already available and accessible), rather than **supporting the initial data infrastructure** itself**.**

Members discussed the potential for the newly announced National Data Library to perform a role in the effective use of data, and leading on data sharing initiatives.

The benefits of greater data sharing: use cases

- Energy: The Energy Digitalisation Taskforce has previously recommended the creation of data sharing infrastructure for the energy system, to enable plug-and-play options for data sharing, thus promoting whole-system interoperability and

[2] https://www.fca.org.uk/publication/corporate/report-using-synthetic-data-in-financial-services.pdf
[3] https://digital.nhs.uk/services/artificial-data
[4] https://lfenergy.org/projects/opensynth/

standardised data sharing. Although this initiative is still in its early stages, the work already undertaken could inform the National Data Library as it evolves.

- Public sector: It was noted that the government and public sector could also be key users of synthetic data, leveraging it to enhance and accelerate policy development and investment decisions.

Key recommendations:

Data access and sharing

1. **Government should create a £500m AI and data for decarbonisation startup fund as part of the 2024 budget, focusing not only on AI applications in decarbonisation, but also on data plumbing and infrastructure.**
    a. This should focus on providing funding for startups seeking to apply AI to key decarbonisation challenges and sectors. The recently established Deep Tech and Climate Fonds in Germany represents a potential comparable initiative.[5]
    b. It should also provide strategic funding for projects that support the **data plumbing and infrastructure** for key decarbonisation challenges and sectors. This should extend to the provision of high quality synthetic data (see also recommendations at 3(b), (c) and (d)).
    c. The fund should be aimed at **making the UK the best place in the world to found an AI for climate startup**, by focusing on supporting early stage startups.
    d. To support this, NESO should publish a technology strategy on incorporating Digital Twin technology and AI technologies for various energy applications (supply chain resilience, optimisation of planning, demand management). This will give a signal to industry on how best to utilise these technologies, and provide state-backed use cases and examples for startups to target.
2. **Government data teams should prioritise creating incentives for improving data access.**
    a. For example in the energy sector, the DESNZ data team should lead a group to explore creating stronger incentives for better data from electricity networks.
    b. This work by data teams should include **rapid examination of relevant regulatory or legal barriers** (for example, the Utilities Act prevents DNOs from providing more data in some cases).
    c. This work should **focus on incentives for widespread data access**, encompassing users from the private, public and non-profit sector, **not just academia**.
3. **Government should take a strategic role in the provision and use of data, including synthetic datasets.**

[5] https://dtcf.de/en/

a. The National Data Library should assume responsibility for the collection, creation and sharing of specific key datasets where there are barriers that prevent third parties from doing so and which cannot be easily addressed (this links to the recommendations at 2(b) and 2(c)).

b. Government should convene relevant stakeholders (e.g. standards institutes, other governments) to **lead the development of international standards to objectively evaluate and benchmark the quality of synthetic data** in different domains and for different use cases. This could build on existing work by FCA in financial services, and NHS Digital in healthcare.

c. Government should **develop its own role as a user of synthetic data**. Government data teams should conduct rapid audits of potential use cases for synthetic data within their portfolios. The Incubator for AI should work collaboratively with government data teams across the public sector to help **pilot some early, real world examples**.

d. The National Data Library should **publish a policy statement on synthetic data**. This could include incorporating guidance on how synthetic data could be used to support policy development (for example through the National Policy Planning Framework), and how collection of real data could enable the ongoing training of synthetic data models.

Managing energy demand and efficiency for industry, homes and data centres

Managing energy demand - data centres

The EWG welcomed the government's interest in state-backed investments prioritising clean energy technologies and critical infrastructure through newly announced bodies such as the National Wealth Fund. As AI increases in usage, it was also noted that demand for renewable energy would likely increase, and the government has an opportunity to align planning for renewable energy and increased AI capacity demand.

However despite the government's focus on net zero and AI innovation, some EWG members highlighted concerns relating to the sustainability of AI technologies and their supporting infrastructure themselves, especially data centres. Government should take an active role in improving data centre energy efficiency, rather than leaving this responsibility solely to industry.

It was also suggested that future government interventions should aim at quantifying the energy demand and carbon emissions associated with AI usage. This would allow for a more accurate comparison of AI's carbon footprint relative to other industries. This will also include developing methods to enable greater transparency and visibility into data centre emissions, as well as efforts to improve the efficiency of algorithms and coding practices.

Members also expressed concerns that the energy demands of AI might compete with housing developments for grid connections.[6] Thoughtful consideration and management of this issue will ensure that AI's benefits are realised, while mitigating its environmental impact.

Lastly, experts also highlighted the importance of regular, predictable funding competitions to enable continuous innovation. The current landscape of funding for innovation is often unsystematic, making it unpredictable for fundees, and does not unlock the full potential for iterative improvements and innovation. It was felt that regular funding competitions released at the same time each year, focused on building on previous achievements and innovation could be much more impactful. Experts suggested that improving the energy efficiency of data centres could be a suitable candidate for these types of regular funding competitions.

Managing energy demand - domestic and commercial

Similarly, the government's target of building 1.5m new homes is set to be met by speeding up planning on stalled housing sites and revisiting previously rejected development proposals. However, connecting these new developments into the existing energy grid raises significant concerns regarding energy demand, capacity, and efficiency. These challenges could be addressed by applying AI models that can help optimise network capacity and management.

This housing target also offers an opportunity for the government to incentivise the use of sustainable materials and digital technologies, such as AI, in the creation of 'smart homes.' EWG members highlighted the potential of AI not only during the planning and construction phases but also in managing these developments once they are operational.

The EWG also proposed assigning new data-sharing responsibilities to parts of the built environment sector (for example with an initial focus on commercial real estate) to ensure greater transparency and facilitate the development of AI-based products and services for decarbonisation.

EWG members also highlighted the significant challenges of securing supply chains for sustainable energy, particularly due to raw materials shortages.

Recommendations:

4. **The UK Government should aim to be the most sustainable place in the world to build and operate data centres.**
    a. Government should evaluate and standardise methods for measuring the emissions of data centres, and encourage industry to publish accurate emissions from their data and AI supply chains. This will help provide an emissions comparison with other sectors.

[6] It is expected that GB Energy will review grid connection procedures to better evaluate the viability and value of different projects in the pipeline.

b. Government should launch a multi-year, funded 'Grand Challenge' competition focused on improving the sustainability of data centres year on year. This should encompass relevant metrics, for example energy efficiency, emissions, water use, and biodiversity impacts.

c. The Government may also want to link planning permissions for data centres to sustainability metrics. The EU is already implementing legislation that requires data centre providers to report on sustainability KPIs.[7]

d. The Government may also want to investigate mechanisms by which the allocation of data centre planning permission can incentivise data centre providers to invest in and utilise renewable sources of energy in the UK. Large enterprises are already conscious that their data energy demands will need to be satisfied by renewable sources of energy.[8]

5. Managing built environment emissions

a. As part of wider reforms of the EPC, a new role of GDPR style "buildings data controller" should be established, initially focused on commercial real estate. The building's data controller would be responsible for collecting and sharing data relating to buildings' attributes and performance including energy flexibility, and energy demand. Government should consult on the scope of such a proposed role.

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7 https://energy.ec.europa.eu/news/commission-adopts-eu-wide-scheme-rating-sustainability-data-centres-2024-03-15_en

8 https://cloud.google.com/blog/topics/sustainability/clean-energy-projects-begin-to-power-google-data-centers