Written evidence submitted By Professor Aoife M. Foley[1,*], Dr Dlzar Al Kez[2], Professor Alice Larkin[3], Professor Carly McLachlan[4], Dr Tim Braunholtz-Speight[5] and Dr Andrew Welfle[6]

in response to the
Great British Energy Bill

Biographies:

Professor Aoife Foley is Chair in Net Zero Infrastructure at The University of Manchester and Editor in Chief of Elsevier's Renewable & Sustainable Energy Reviews, the leading global sustainability journal in the world. She has a BE in Civil & Environmental Engineering (1996), a PhD in Energy Engineering (2011) from University College Cork and an MScEng in Transportation Engineering (1999) from Trinity College Dublin. Prior to joining academia fulltime in 2011, she spent 15 years in senior project management roles in industry. She led key transformative projects in energy, telecoms, transport, and pharmaceuticals. Her research expertise covers gas and power systems, energy markets, energy system modelling, demand response technologies (e.g., energy storage). Aoife has given keynote presentations across the world and has received multiple awards including for research innovation leading to real world impact (e.g. Bill Curtain Award 2019 from the ICE; Jose Maria Sarriegi Major Catastrophe Research Award 2019 from the Queen of Spain). She is a Chartered Engineer, Fellow of Engineers Ireland and Senior Member of the IEEE. She has won research awards of £4M from the Irish Environmental Protection Agency, Sustainable Energy Authority of Ireland, Science Foundation Ireland, the US National Foundation, EU Interreg Programme, the Department for Economy in Northern Ireland, HM Treasury, and the EPSRC.

Dr Dlzar Al Kez is a Research Associate in Net Zero Infrastructure at The University of Manchester. He received the BSc in Electrical Engineering from the University of Sulaimani, Sulaymaniyah, Iraq (2009) and the MSc degree in Electrical Power Engineering from the University of Southampton (2012) and a PhD in Electrical Engineering and Electronics Engineering from Queen's University Belfast. He has over 14 years of experience in both academia and industry, having worked with Sakar Power Generation, electrical design firms, and as a laboratory manager. Prior to pursuing his PhD, he was the Director of the Telecom Power Department at IQ Group, the largest fibre optic internet provider in Iraq. He is a Chartered Engineer (CEng) and a Member of the IET. His research interest includes power system dynamic, stability issues with high distributed generation penetration, energy storage, smart appliances and data centres.

Professor Alice Larkin is Professor in Climate Science & Energy Policy as part of the Tyndall Centre for Climate Change Research in the School of Engineering. Alice trained as an astrophysicist at the University of Leeds (1996), did her PhD in climate modelling at Imperial College (2000), then worked in science communication. She returned to academia in 2003 joining the interdisciplinary Tyndall Centre to research conflicts between climate change and aviation. In 2008 she was appointed as a lecturer to direct projects on international transport and food supply scenarios within a climate change context

[1, *] ***Corresponding author:*** Professor Aoife M. Foley, Chair in Net Zero Infrastructure, School of Engineering, Joint appointment to the Departments of Electrical and Electronic Engineering and Civil and Engineering Management, The University of Manchester, Oxford Rd, Manchester, M13 9PL

[2] Dr Dlzar Al Kez, Research Associate Net Zero Infrastructure, School of Engineering, Joint appointment to the Departments of Electrical and Electronic Engineering and Civil and Engineering Management, The University of Manchester, Oxford Rd, Manchester, M13 9PL

[3] Professor Alice Larkin, Professor of Climate Science and Energy Policy, School of Engineering, Department of Civil and Management Engineering, Tyndall Centre, The University of Manchester, Oxford Rd, Manchester, M13 9PL

[4] Professor Carly McLachlan, Professor of Climate, School of Engineering, Department of Civil and Management Engineering, Tyndall Centre, The University of Manchester, Oxford Rd, Manchester, M13 9PL

[5] Dr Tim Braunholtz-Speigh, Lecturer in Climate, School of Engineering, Department of Civil and Management Engineering, Tyndall Centre, The University of Manchester, Oxford Rd, Manchester, M13 9P

[6] Dr Andrew Welfle, Senior Research Fellow, School of Engineering, Department of Civil and Management Engineering, Tyndall Centre, The University of Manchester, Oxford Rd, Manchester, M13 9PL

and was Director of Tyndall Manchester between 2013 and 2016. In 2017 Alice became the Head of School of Mechanical, Aerospace and Civil Engineering, and then from 2019 to 2023, the Vice-Dean and Head of the newly formed School of Engineering. Her research interests continue to focus on the decarbonisation challenges surrounding aviation and shipping, and connections with carbon budgeting and the wider energy system more generally.

Professor Carly McLachlan is Professor in Climate as part of the Tyndall Centre for Climate Change Research in the School of Engineering. Carly is the Director of Tyndall Manchester - an interdisciplinary team working on policy relevant research on climate change. She is based within the School of Engineering at The University of Manchester. Her research interests focus on how stakeholders, including publics, engage with energy and sustainability issues and how 'evidence' is used within this. She has a BSc in Management (2003) and a PhD in Science, Technology and Innovation Policy (2009) from The University of Manchester. Her current research focuses on city and local authority climate action. Carly is also Associate Director of the ESRC Centre for Climate Change and Social Transformation (CAST).

Dr Tim Braunholtz-Speight is a Lecturer and Research Fellow based in the Tyndall Centre for Climate Change Research. He has a BA in Politics and Philosophy (1993) and an MA in the Politics of International Resources and Development (2000) from the University of Leeds and a PhD in Power and community in Scottish community land initiatives (2015) from the University of Highlands and Islands. He is currently researching city-level action to mitigate climate change, as a member of the CAST Centre. His other recent work includes a study of local energy business models as part of the EnergyREV consortium, the UKERC Financing Community Energy research project, and a study of community infrastructure businesses funded by Power to Change. His previous experience includes studies of alternative finance in the UK, and community ownership and land reform in Scotland. Prior to joining the Tyndall Centre, he has held research posts at the University of Leeds, the Overseas Development Institute, the University of the Highlands and Islands, and Leeds Beckett University.

Dr Andrew Welfle is Senior Research Fellow within the Tyndall Centre for Climate Change Research at the University. He has a Master's in Sustainable Business (MA) from the University of Leeds and a Master's in Energy & Sustainable Building Design (MSc) from De Montfort University and a PhD in Environmental Engineering from The University of Manchester. Andrew is a Chartered Engineer and has over 15 years' experience working on energy, sustainability and climate change projects. He is the University of Manchester's 'Sustainable Futures' Challenge Lead for Net Zero and completed a 6-year term as a Topic Representative within the UK Supergen Bioenergy Hub network and (>£5m) research programme. Andrew has also worked for the UK Department for Energy & Climate Change (DECC) and previously worked in industry for a large engineering consultancy (AECOM).

The following submission of <u>2,530 words excluding bibliography</u>, which demonstrates our expertise, reflects the diverse research and ideas collated across the aforementioned authors.

Submission

Summary:
It is welcome to see commitments made by the new government in the GB Energy Bill. One of the most significant opportunities presented by the Bill is the potential for an accelerated transition to a low-carbon economy. The Bill has the potential to drive a faster transition to a low-carbon economy, positioning the UK as a leader in combating climate change. The Bill reflects the efforts made by successive governments to steer the UK on a pathway towards decarbonisation. However, it should be recognised that there is much work still required to align with the challenges laid out in the Paris Climate Agreement and its principle of equity.

By establishing GB Energy and providing it with substantial funding, the government creates a powerful tool for driving clean energy deployment and growth in jobs and skills. It is hoped that this could lead

to faster-than-expected reductions in greenhouse gas emissions, positioning the UK as a leader in global efforts to combat climate change. An accelerated transition could also result in earlier realisation of health benefits from cleaner air and water, improving the overall quality of life for citizens.

These themes outlined in the call for evidence are explored in more detail below in the form of a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. We are also happy to meet with stakeholders in any government departments, Members of Parliament, The Lords, Ofgem, the National Energy System Operator, GB Energy and stakeholders to provide specific in-depth details on delivering our recommendations and explain our findings based on our evidence listed in the Bibliography.

Recommendations:

- Use language that recognises that this is a ‘whole system’ challenge.
- Take a regional approach to energy resource optimization with more decentralized energy systems to enhance local security and reduce grid strain using smart grids, embedded and distributed energy sources, large growing loads such as data centres, advanced weather warning systems, sustainable AI and IOT, energy market mechanism and smart systems.
- Create an integrated multidisciplinary team of engineers, quantity surveyors, scientists, social scientists and economists to undertake to mitigate against risks and ballooning costs and negative societal impacts.
- Enhanced R&D investment is required for hydrogen and ammonia storage technologies, as well as in nature based solutions (NBS), Carbon Capture and Storage (CCS), Carbon Capture, Utilisation and Storage (CCUS) and other emerging technologies to ensure actual deployment, scalability and efficiency, if and where appropriate.
- Enhance R&D investment in demand-side technologies and system efficiencies that together can ease pressure on supply and storage infrastructure.
- Develop heat networks as they are key to decarbonisation of the buildings sector.
- Provide hydrogen production, biomass, demand response, geothermal, solar and onshore repowering interventions across sectors for energy diversification as part of an energy market restructuring.
- Collaborate with international partners to mitigate geopolitical energy risks.
- Adjust tax arrangements for transport entities wishing to plug into UK ports.
- Comprehensive support for airport, rail and bus hubs in their decarbonisation plans using an integrated approach.
- Growing public sector investment alongside citizen finance could be used to develop more energy projects, and spread the financial benefits of those projects, more widely than would otherwise be the case.
- Run programmes to train, upskill, reskill and redeploy tradespersons, scientists, technicians and engineers to support the low carbon transition.
- Undertake a public education scheme with building retrofitting to include controls, in addition to insulation, so citizens and business owners become more efficient informed energy users.
- Develop standardised measurement frameworks, carbon accounting and certification rules, and risk and rating obligations across sectors and supply chains for Scope 1,2 and 3 emissions urgently to apply equitable carbon pricing and to ensure carbon investments will provide returns to investors. Carbon markets need careful oversight and regulation.
- Establish clear benchmarks and timelines for phasing out fossil fuel dependency in tandem with realistic scaling and deployment of our low carbon and carbon capture technologies to have a structured exit, reusing infrastructure for low-carbon energy opportunities (e.g. geothermal, hydrogen storage) and create an orderly transition of businesses operating in fossil fuels to low carbon opportunities.

A: Clean Energy Production, Distribution, Storage, and Supply:
Diversifying the UK energy mix with renewables, biogas, green hydrogen, green ammonia, and e-fuels enhances security and flexibility, reducing risks from relying on a single energy source amid geopolitical market volatility. This diversification can support various sectors, including industrial processes, transportation, and agriculture, providing pathways for regional transitions. It will also provide dispatchable energy to balance both the UK baseload and variable peak demands.

Utilising existing infrastructure, like grid and storage facilities, can streamline the clean energy transition and minimize new development costs. However, maintaining both fossil fuel and clean energy systems could complicate operations and increase expenses. Timely and urgent upgrades, such as smart grid technologies, are essential to avoid inefficiencies and supply issues during the transition.

Despite an £8.3 billion government investment, financial challenges persist in developing infrastructure and adopting clean technologies. Support mechanisms, such as subsidies and loans, are crucial for sectors struggling to meet ambitious clean energy targets. Current storage solutions for hydrogen and ammonia are still maturing, posing risks of supply gaps. Additionally, the taxation of electricity versus untaxed fuels may hinder international transport decarbonisation efforts.

Technological hurdles remain for large-scale deployment of clean energy technologies. Hydrogen production and carbon capture technologies face developmental challenges that could slow progress. The expectation is that hydrogen in all colours will scale-up rapidly, but there are significant technical (and economic) challenges, particularly around green hydrogen, as well as around its appropriate applications and use. The urgency of cutting greenhouse gas emissions must be aligned with timelines for achieving the Paris Climate Agreement goals, given that costly climate impacts that will only accelerate with a failure to deliver.

Realising and prioritising the huge opportunities in the UK for renewable energy system expansion, including ultimately in using surplus electricity to generate e-fuels, demand response opportunities (e.g. hot water heating, storage heating), coupled with associated upgrading and expansion of electrical infrastructure development, must be central to the UK's transition plans. Striking the right balance between massive electrification, and diversification across other energy sectors is critical to not over investing in electricity grids. Diversification is paramount, considering these costs will be socialised and reflected in energy bills. The reconfiguration of the gas grid also needs to be funded, so diversification is key to balance and spread costs.

We are also mindful of the huge commitment to floating offshore wind that may not deliver in the timescale discussed, plus there may be also sucken costs, which is why repowering onshore is suggested as a more prudent approach to guarantee energy supply. The urgency of cutting greenhouse gas emissions complicates timelines for achieving the Paris Climate Agreement goals.

Reliance on imported fuels exposes the UK to geopolitical risks, making supply vulnerable to global disruptions. A shift toward a smart energy market that uses AI and advanced weather forecasting is necessary for balancing where possible reducing demand across sectors, positioning the UK as a leader in smart and renewable technology.

B: Reduction of Greenhouse Gas Emissions from Energy produced from Fossil Fuels:
Carbon Sequestration (CS), Carbon Capture, Utilisation, and Storage (CCUS), and Carbon Capture and Storage (CCS) offer opportunities to reduce emissions from fossil fuel-dependent industries, like Tata Steel and British Steel, by capturing carbon directly from production processes. This approach can mitigate environmental impacts while allowing continued operations during the transition to cleaner technologies. However, delays in CCUS and CCS implementation could hinder emissions targets, necessitating contingency plans.

In addition, bioenergy with carbon capture and storage (BECCS) is receiving attention to support the net removal of carbon from the atmosphere. Although these technologies are advancing, many questions remain as to the scale of technology deployment that may be achieved and the extent that sustainable biomass supply chains may be established. Large scale deployment of BECCS technologies in the UK will likely require trade-offs in where UK biomass resource are prioritised, and/or extensive increased access to sustainable resources from international markets. This typically leads to credibility questions and market challenges.

While carbon sequestration in land and seas presents nature-based solutions for carbon offsetting, the high costs and logistical barriers of CCUS/CCS technologies may lead to increased energy prices and affect industrial competitiveness. Without substantial financial support or incentives, many businesses may struggle to justify the investments needed for implementation, which could inadvertently prolong reliance on fossil fuels. Moreover, it is likely that any nature-based sequestration (also called nature based solutions - NBS) will be required to offset agricultural emissions given their scale, and so should not be considered as an offset for energy system emissions where carbon reduction should be prioritised.

GB Energy's strategy should integrate multiple sectors—industry, manufacturing, agriculture, transport, and nuclear—to target energy and emissions reductions and decrease fossil fuel dependency. Opportunities include heat networks, biofuels, hydrogen, and electrification of farming machinery. However, companies may hesitate to adopt new technologies due to costs and uncertainty, potentially slowing progress toward emissions goals. Building partnerships with industry and the private sector, alongside Great British Nuclear, could facilitate technology transfer and accelerate adoption.

Agriculture poses unique challenges due to its varied emissions profiles. Reducing methane and nitrous oxide emissions while promoting the electrification of farming equipment can enhance decarbonisation efforts, allowing the sector to contribute to the UK's energy supply through biogas production. However, opportunities to do so around methane and nitrous oxide are more limited that mitigation energy-related greenhouse gases.

C: Improvements in Energy Efficiency:
Enhancing energy efficiency and reducing energy use in buildings is crucial for reducing carbon emissions. Upgrading insulation, heating systems (like heat pumps), and retrofitting with energy-efficient materials can significantly lower energy consumption in residential and commercial sectors. These measures align with GB Energy’s goals of promoting cleaner energy use, lowering electricity demand, and improving living conditions. Additionally, energy efficiency can reduce energy bills, alleviate energy poverty, and enhance public health through better indoor air quality.

However, retrofitting the UK's existing buildings is complex and costly, particularly for older, inefficient properties. The financial and logistical challenges of large-scale retrofitting may impede GB Energy's targets, especially in low-income areas lacking resources. A shortage of skilled labour further complicates these efforts. Furthermore, a bigger media campaign on energy saving and smart controls in our existing building stock should be part of any retrofitting schemes so that citizens and business owners alike understand the savings, emissions reductions and techniques to improve their heating and cooling needs.

In the transport sector, electrification of public and private transport has faced challenges, with missed targets contributing to public scepticism about government policies. Integrating electric vehicles and expanding public transport are essential for reducing fossil fuel reliance. Investment in active transport infrastructure, such as cycling and walking paths, can also lower urban energy use and promote healthier cities. However, high upfront costs for infrastructure and vehicle replacements slow adoption rates, making incentives and subsidies vital for encouraging transitions.

Information and Communication Technologies (ICT) can optimize energy consumption across sectors. Low-carbon data centres, smart grids, and IoT devices enable real-time energy management and improve supply chain sustainability, plus also optimise whole system energy integration across sectors. ICT also aids in tracking Scope 3 emissions, helping industries reduce carbon intensity, thereby enhancing the UK's competitiveness in low-carbon trade. Cybersecurity measures are essential to protect these systems from threats that could disrupt energy management.

While energy efficiency gains in industry, agriculture, and transport can lead to emission reductions, these improvements are often incremental rather than transformational. Many industries are near their efficiency limits, requiring new processes or technologies that are costly and time-consuming. Strong incentives and a restructured energy market that allows broader participation can provide alternative revenue streams, easing the financial burden of new low-carbon infrastructure.

D: Measures for Ensuring Energy Supply Security:

The UK's reliance on imported equipment for energy-efficient technologies (e.g., smart meters, turbines, solar panels) and fossil fuels and biomass exposes it to supply chain vulnerabilities. Disruptions due to geopolitical tensions or trade restrictions threaten the rollout of these technologies and the UK's decarbonisation efforts. This jeopardizes the integrated energy system envisioned by GB Energy, which relies on smooth transitions across sectors. To mitigate risks, establishing resilient supply chains and exploring local sourcing options are essential.

By linking electricity, gas, and liquid fuels across sectors and systems, GB Energy can address renewable variability and enhance resilience against geopolitical tensions. For instance, electrifying the rail freight network reduces diesel reliance, contributing to energy security and emissions reduction. However, GB Energy's focus on electricity decarbonisation overlooks critical energy end-uses and the need for a comprehensive approach that includes geothermal heating, air source heat pumps, and enhanced public transport. An integrated energy system across sectors is vital for achieving full decarbonisation.

As the UK transitions to renewable energy, intermittency poses risks. While energy storage technologies can help, they are not yet widespread enough to ensure energy security during low generation periods. Investing in diverse energy storage solutions, like compressed air, must be balanced to avoid idle facilities. Optimizing the type, amount, and location of storage is crucial to minimize costs and hidden expenses. Improving load, grid, and network planning through localized solutions, such as distributed energy generation and demand-side management (e.g. EnergyCloud), can relieve pressure on central power stations. This flexibility can accommodate renewable energy and reduce the need for large-scale infrastructure investments. Hydrogen storage, ammonia, and biogas can support industrial demand, while electrifying the freight rail network enhances energy security and reduces fossil fuel dependency. We also reiterate that repowering onshore is very critical, floating offshore has immense opportunities, but in the short to medium term a prudent contingency is repowering onshore to maintain security of energy supply. This must be done in timely manner to avoid capacity issues in the next five to seven years.

Decentralizing the energy system with microgrids and local renewable generation can enhance energy security. Community energy projects, such as those by Energy4All and Ripple Energy, play a crucial role in deploying clean energy. Supporting these initiatives with financial security measures will help promote local energy solutions. Partnerships with community energy groups can accelerate the adoption of energy efficiency measures.

The shift to low-carbon economies offers the UK a chance to lead in exporting energy-efficient goods and services. By integrating energy efficiency across industries, the UK can reduce Scope 3 emissions and improve competitiveness in global markets focused on sustainability. This aligns with increasing demands for lower-carbon products in light of environmental, social, and governance (ESG) requirements.

GB Energy's plans to maintain North Sea oil and gas production conflict with the Paris Climate Agreement and exacerbate global inequalities. The reliance on Integrated Assessment Models, which prioritize speculative technical fixes over social and demand-side changes, poses risks. A shift in decision-making approaches is urgently needed to address climate impacts and support the decarbonisation and reskilling of the oil and gas sector and the shipping industry. Finally, we applaud the government on locating GB Energy HQ in Aberdeen, which is a world leader in engineering and infrastructure, as a positive first step to decarbonise the oil and gas industry and the shipping industry.

Disclaimer
The views and opinions expressed in this paper may not necessarily reflect those of The University of Manchester and or any of our research funders.

Bibliography

Abazari A., Soleymani M.M., Kamwa I., Babaei M., Ghafouri M., Muyeen S.M., **Foley A.M**. *A reliable and cost-effective planning framework of rural area hybrid system considering intelligent weather forecasting* (2021) Energy Reports, 7, pp. 5647 - 5666, Cited 13 times. DOI: 10.1016/j.egyr.2021.08.196

Ahmed F., **Al Kez D**., McLoone S., Best R.J., Cameron C., **Foley A.M**. *Dynamic grid stability in low carbon power systems with minimum inertia* (2023) Renewable Energy, 210, pp. 486 - 506, Cited 40 times. DOI: 10.1016/j.renene.2023.03.082

Ahmed F., **Foley A.M**., Dowds C., Johnston B., **Al Kez D**. *Assessing the engineering, environmental and economic aspects of repowering onshore wind energy* (2024) Energy, 301, art. no. 131759, Cited 2 times. DOI: 10.1016/j.energy.2024.131759

Al Kez D., **Foley A.M**., Abdul Z.K., Del Rio D.F. *Energy poverty prediction in the United Kingdom: A machine learning approach* (2024) Energy Policy, 184, art. no. 113909, Cited 11 times. DOI: 10.1016/j.enpol.2023.113909

Al Kez D., **Foley A.M**., Ahmed F., Morrow D.J.*, Overview of frequency control techniques in power systems with high inverter-based resources: Challenges and mitigation measures* (2023) IET Smart Grid, 6 (5), pp. 447 - 469, Cited 11 times. DOI: 10.1049/stg2.12117

Al Kez D., **Foley A.M**., Ahmed F.W., O'Malley M., Muyeen S.M. *Potential of data centers for fast frequency response services in synchronously isolated power systems* (2021) Renewable and Sustainable Energy Reviews, 151, art. no. 111547, Cited 19 times. DOI: 10.1016/j.rser.2021.111547

Al Kez D., **Foley A.M**., Brogan P., Morrow D.J. *Utilizing data centers for inertia and fast frequency response services* (2020) 2020 2nd International Conference on Smart Power and Internet Energy Systems, SPIES 2020, art. no. 9243001, pp. 368 - 373, Cited 2 times. DOI: 10.1109/SPIES48661.2020.9243001

Al Kez D., **Foley A.M**., Laverty D., Del Rio D.F., Sovacool B. *Exploring the sustainability challenges facing digitalization and internet data centers* (2022) Journal of Cleaner Production, 371, art. no. 133633, Cited 35 times. DOI: 10.1016/j.jclepro.2022.133633

Al kez D., **Foley A.M**., McIlwaine N., Morrow D.J., Hayes B.P., Zehir M.A., Mehigan L., Papari B., Edrington C.S., Baran M. *A critical evaluation of grid stability and codes, energy storage and smart loads in power systems with wind generation* (2020) Energy, 205, art. no. 117671, Cited 84 times. DOI: 10.1016/j.energy.2020.117671

Al Kez D., **Foley A.M**., Muyeen S.M., John Morrow D. *Manipulation of static and dynamic data center power responses to support grid operations* (2020) IEEE Access, 8, pp. 182078 - 182091, Cited 11 times. DOI: 10.1109/ACCESS.2020.3028548

Al Kez D., Lowans C., **Foley A.M**. *Sustainable Development in Third Level Programs: Distilling a Pathway to a True Net-Zero Education* (2024) Sustainability (Switzerland), 16 (5), art. no. 1998, Cited 2 times. DOI: 10.3390/su16051998

Almenta M.M., Morrow J., Best R., Fox B., **Foley A.M**. *A smart load appliance application using a single compressor fridge-freezer to support grid operations* (2014) Proceedings of the Universities Power Engineering Conference, art. no. 6934662, Cited 6 times.

Anderson K., Bows A., Mander S. *From long-term targets to cumulative emission pathways: Reframing UK climate policy* (2008) Energy Policy, 36 (10), pp. 3714 - 3722, Cited 86 times. DOI: 10.1016/j.enpol.2008.07.003

Anderson K., Le Quéré C., **McLachlan C**. *Radical emission reductions: The role of demand reductions in accelerating full decarbonization* (2014) Carbon Management, 5 (4), pp. 321 - 323, Cited 14 times. DOI: 10.1080/17583004.2014.1055080

Bows A., Anderson K., Footitt A. *Aviation in a low-carbon EU (2012) Climate Change and Aviation: Issues, Challenges and Solutions*, pp. 89 - 110, Cited 11 times.

Bows A., Anderson K., Peeters P. *Air transport, climate change and tourism* (2009) Tourism and Hospitality, Planning and Development, 6 (1), pp. 7 - 20, Cited 67 times. DOI: 10.1080/14790530902847012

Bows A., Anderson K., Upham P. *Aviation and climate change: Lessons for European policy* (2008) Aviation and Climate Change: Lessons for European Policy, pp. 1 - 146, Cited 25 times. DOI: 10.4324/9780203891896

Bows A., Smith T. *The (low-carbon) shipping forecast: Opportunities on the high seas* (2012) Carbon Management, 3 (6), pp. 525 - 528, Cited 2 times. DOI: 10.4155/cmt.12.68

Bows-Larkin A., Anderson K., Mander S., Traut M., Walsh C. *Shipping charts a high carbon course* (2015) Nature Climate Change, 5 (4), pp. 293 - 295, Cited 32 times. DOI: 10.1038/nclimate2532

Bows-Larkin A., **McLachlan C**., Mander S., Wood R., Röder M., Thornley P., Dawkins E., Gough C., O'Keefe L., Sharmina M. *Importance of non-CO_2 emissions in carbon management* (2014) Carbon Management, 5 (2), pp. 193 - 210, Cited 15 times. DOI: 10.1080/17583004.2014.913859

Boyle J., Littler T., **Foley A.M**. *Battery energy storage system state-of-charge management to ensure availability of frequency regulating services from wind farms* (2020) Renewable Energy, 160, pp. 1119 - 1135, Cited 34 times. DOI: 10.1016/j.renene.2020.06.025

Boyle J., Littler T., **Foley A.M**. *Aggregator control of battery energy storage in wind power stations to maximize availability of regulation service* (2024) Energy Conversion and Management: X, 24, art. no. 100703, Cited 0 times. DOI: 10.1016/j.ecmx.2024.100703

Boyle J., Littler T., **Foley A.M**. *Coordination of synthetic inertia from wind turbines and battery energy storage systems to mitigate the impact of the synthetic inertia speed-recovery period* (2024) Renewable Energy, 223, art. no. 120037, Cited 5 times. DOI: 10.1016/j.renene.2024.120037

Boyle J., Littler T., Muyeen S.M., **Foley A.M**. *An alternative frequency-droop scheme for wind turbines that provide primary frequency regulation via rotor speed control* (2021) International Journal of Electrical Power and Energy Systems, 133, art. no. 107219, Cited 35 times. DOI: 10.1016/j.ijepes.2021.107219

Braunholtz-Speight T., **McLachlan C**., Mander S., Hannon M., Hardy J., Cairns I., Sharmina M., Manderson E. *The long term future for community energy in Great Britain: A co-created vision of a thriving sector and steps towards realising it* (2021) Energy Research and Social Science, 78, art. no. 102044, Cited 21 times. DOI: 10.1016/j.erss.2021.102044

Braunholtz-Speight T., Sharmina M., Manderson E., **McLachlan C**., Hannon M., Hardy J., Mander S. *Business models and financial characteristics of community energy in the UK* (2020) Nature Energy, 5 (2), pp. 169 - 177, Cited 41 times. DOI: 10.1038/s41560-019-0546-4

Braunholtz-Speight T., Sharmina M., Manderson E., **McLachlan C**., Hannon M., Hardy J., Mander S. *Price support allows communities to raise low-cost citizen finance for renewable energy projects* (2020) Nature Energy, 5 (2), pp. 127 - 128, Cited 7 times. DOI: 10.1038/s41560-020-0556-2

Braunholtz-Speight T., Sharmina M., Pappas D., Webb J., Fuentes-González F., Hannon M. *Smart power to the people: Business models for engaging domestic energy users in smart local energy systems in Britain* (2024) Energy Research and Social Science, 110, art. no. 103443, Cited 0 times. DOI: 10.1016/j.erss.2024.103443

Brown A., **Foley A.M**., Laverty D., McLoone S., Keatley P. *Heating and cooling networks: A comprehensive review of modelling approaches to map future directions* (2022) Energy, 261, art. no. 125060, Cited 25 times. DOI: 10.1016/j.energy.2022.125060

Brown A., Hampton H., **Foley A.M**., Furszyfer Del Rio D., Lowans C., Caulfield B. *Understanding domestic consumer attitude and behaviour towards energy: A study on the Island of Ireland* (2023) Energy Policy, 181, art. no. 113693, Cited 6 times. DOI: 10.1016/j.enpol.2023.113693

Bu S., Meegahapola L.G., Wadduwage D.P., **Foley A.M**. *Stability and Dynamics of Active Distribution Networks (ADNs) With D-PMU Technology: A Review* (2023) IEEE Transactions on Power Systems, 38 (3), pp. 2791 - 2804, Cited 21 times. DOI: 10.1109/TPWRS.2022.3179488

Bullock S., Mason J., **Bows-Larkin A**. *The urgent case for stronger climate targets for international shipping* (2022) Climate Policy, 22 (3), pp. 301 - 309, Cited 27 times. DOI: 10.1080/14693062.2021.1991876

Cairns I., Hannon M., **Braunholtz-Speight T**., **McLachlan C**., Mander S., Hardy J., Sharmina M., Manderson E. *Financing grassroots innovation diffusion pathways: the case of UK community energy* (2023) Environmental Innovation and Societal Transitions, 46, art. no. 100679, Cited 7 times. DOI: 10.1016/j.eist.2022.11.004

Cameron C., McLoone S., Furszyfer Del Rio D.D., Rooney D., **Foley A.M**. *A techno-economic analysis of a co-located wastewater treatment and hydrogen facility* (2023) Journal of Cleaner Production, 421, art. no. 138468, Cited 1 times. DOI: 10.1016/j.jclepro.2023.138468

Caulfield B., Furszyfer D., Stefaniec A., **Foley A.M**. *Measuring the equity impacts of government subsidies for electric vehicles* (2022) Energy, 248, art. no. 123588, Cited 48 times. DOI: 10.1016/j.energy.2022.123588

Charly A., Thomas N.J., **Foley A.M**, Caulfield B. *Identifying optimal locations for community electric vehicle charging* (2023) Sustainable Cities and Society, 94, art. no. 104573, Cited 33 times. DOI: 10.1016/j.scs.2023.104573

Cooper S.J.G., Green R., Hattam L., Röder M., **Welfle A**., McManus M. *Exploring temporal aspects of climate-change effects due to bioenergy* (2020) Biomass and Bioenergy, 142, art. no. 105778, Cited 9 times. DOI: 10.1016/j.biombioe.2020.105778

Corbett J., Carroll D., Laurie H., Hurley B., **Foley A.M**. *Managing Future offshore wind power variability in a European Supergrid* (2013) 12th International Conference on Environment and Electrical Engineering, EEEIC 2013, art. no. 6549582, pp. 579 - 583, Cited 6 times. DOI: 10.1109/EEEIC.2013.6549582

Creamer E., Eadson W., van Veelen B., Pinker A., Tingey M., **Braunholtz-Speight T**., Markantoni M., Foden M., Lacey-Barnacle M. *Community energy: Entanglements of community, state, and private sector* (2018) Geography Compass, 12 (7), art. no. e12378, Cited 139 times. DOI: 10.1111/gec3.12378

Cross S., **Welfle A**., Thornley P., Syri S., Mikaelsson M. *Bioenergy development in the UK & Nordic countries: A comparison of effectiveness of support policies for sustainable development of the bioenergy sector* (2021) Biomass and Bioenergy, 144, art. no. 105887, Cited 29 times. DOI: 10.1016/j.biombioe.2020.105887

Curry R., Pérez-Camacho M.N., Brennan R., Gilkinson S., Cromie T., Foster P., Smyth B., Orozco A., Groom E., Murray S., Hanna J.-A., Kelly M., Burke M., Black A., Irvine C., Rooney D., Glover S., McCullough G., **Foley A.M**., Ellis G. *Quantification of anaerobic digestion feedstocks for a regional bioeconomy* (2018) Proceedings of Institution of Civil Engineers: Waste and Resource Management, 171 (4), pp. 94 - 103, Cited 10 times. DOI: 10.1680/jwarm.17.00014

Davis M., **Braunholtz-Speight T**., Wardrop R. *Crowdfunding as democratic finance? Understanding how and why UK investors trust these markets* (2020) Revista Internacional de Sociologia, 78 (4), art. no. e173, Cited 2 times. DOI: 10.3989/RIS.2020.78.4.M20.005

Devlin J., Li K., Higgins P., **Foley A.M**. *A multi vector energy analysis for interconnected power and gas systems* (2017) Applied Energy, 192, pp. 315 - 328, Cited 42 times. DOI: 10.1016/j.apenergy.2016.08.040

Devlin J., Li K., Higgins P., **Foley A.M**. *Gas generation and wind power: A review of unlikely allies in the United Kingdom and Ireland* (2017) Renewable and Sustainable Energy Reviews, 70, pp. 757 - 768, Cited 34 times. DOI: 10.1016/j.rser.2016.11.256

Devlin J., Li K., Higgins P., **Foley A.M**. *System flexibility provision using short term grid scale storage* (2016) IET Generation, Transmission and Distribution, 10 (3), pp. 697 - 703, Cited 20 times. DOI: 10.1049/iet-gtd.2015.0460

Devlin J., Li K., Higgins P., **Foley A.M**. *The importance of gas infrastructure in power systems with high wind power penetrations* (2016) Applied Energy, 167, pp. 294 - 304, Cited 52 times. DOI: 10.1016/j.apenergy.2015.10.150

Dhiman H.S., Deb D., **Foley A.M**. *Bilateral Gaussian Wake Model Formulation for Wind Farms: A Forecasting based approach* (2020) Renewable and Sustainable Energy Reviews, 127, art. no. 109873, Cited 33 times. DOI: 10.1016/j.rser.2020.109873

Dreglea A., **Foley A.M**., Häger U., Sidorov D., Tomin N. *Hybrid renewable energy systems, load and generation forecasting, new grids structure, and smart technologies* (2020) Solving Urban Infrastructure Problems Using Smart City Technologies: Handbook on Planning, Design, Development, and Regulation, pp. 475 - 484, Cited 5 times. DOI: 10.1016/B978-0-12-816816-5.00022-X

Fazey I., Schäpke N., Caniglia G., Hodgson A., Kendrick I., Lyon C., Page G., Patterson J., Riedy C., Strasser T., Verveen S., Adams D., Goldstein B., Klaes M., Leicester G., Linyard A., McCurdy A., Ryan P., Sharpe B., Silvestri G., Abdurrahim A.Y., Abson D., Adetunji O.S., Aldunce P., Alvarez-Pereira C., Amparo J.M., Amundsen H., Anderson L., Andersson L., Asquith M., Augenstein K., Barrie J., Bent D., Bentz J., Bergsten A., Berzonsky C., Bina O., Blackstock K., Boehnert J., Bradbury H., Brand C., Böhme (born Sangmeister) J., Bøjer M.M., Carmen E., Charli-Joseph L., Choudhury S., Chunhachoti-ananta S., Cockburn J., Colvin J., Connon I.L.C., Cornforth R., Cox R.S., Cradock-Henry N., Cramer L., Cremaschi A., Dannevig H., Day C.T., de Lima Hutchison C., de Vrieze A., Desai V., Dolley J., Duckett D., Durrant R.A., Egermann M., Elsner (Adams) E., Fremantle C., Fullwood-Thomas J., Galafassi D., Gobby J., Golland A., González-Padrón S.K., Gram-Hanssen I., Grandin J., Grenni S., Lauren Gunnell J., Gusmao F., Hamann M., Harding B., Harper G., Hesselgren M., Hestad D., Heykoop C.A., Holmén J., Holstead K., Hoolohan C., Horcea-Milcu A.-I., Horlings L.G., Howden S.M., Howell R.A., Huque S.I., Inturias Canedo M.L., Iro C.Y., Ives C.D., John B., Joshi R., Juarez-Bourke S., Juma D.W., Karlsen B.C., Kliem L., Kläy A., Kuenkel P., Kunze I., Lam D.P.M., Lang D.J., **Bows-Larkin A**., Light A., Luederitz C., Luthe T., Maguire C., Mahecha-Groot A.-M., Malcolm J., Marshall F., Maru Y., **McLachlan C**., Mmbando P., Mohapatra S., Moore M.-L., Moriggi A., Morley-Fletcher M., Moser S., Mueller K.M., Mukute M., Mühlemeier S., Naess L.O., Nieto-Romero M., Novo P., ÓBrien K., O'Connell D.A., O'Donnell K., Olsson P., Pearson K.R., Pereira L., Petridis P., Peukert D., Phear N., Pisters S.R., Polsky M., Pound D., Preiser R., Rahman M.S., Reed M.S., Revell P., Rodriguez I., Rogers B.C., Rohr J., Nordbø Rosenberg M., Ross H., Russell S., Ryan M., Saha P., Schleicher K., Schneider F., Scoville-Simonds M., Searle B., Sebhatu S.P., Sesana E., Silverman H., Singh C., Sterling E., Stewart S.-J., Tàbara J.D., Taylor D., Thornton P., Tribaldos T.M., Tschakert P., Uribe-Calvo N., Waddell S., Waddock S., van der Merwe L., van Mierlo B., van Zwanenberg P., Velarde S.J., Washbourne C.-L., Waylen K., Weiser A., Wight I., Williams S., Woods M., Wolstenholme R., Wright N., Wunder S., Wyllie A., Young H.R. *Transforming knowledge systems for life on Earth: Visions of future systems and how to get there* (2020) Energy Research and Social Science, 70, art. no. 101724, Cited 160 times. DOI: 10.1016/j.erss.2020.101724

Fitzgerald N., **Foley A.M**., McKeogh E. *Integrating wind power using intelligent electric water heating* (2012) Energy, 48 (1), pp. 135 - 143, Cited 59 times. DOI: 10.1016/j.energy.2012.03.014

Foley A.M., Díaz Lobera I. *Impacts of compressed air energy storage plant on an electricity market with a large renewable energy portfolio* (2013) Energy, 57, pp. 85 - 94, Cited 102 times. DOI: 10.1016/j.energy.2013.04.031

Foley A.M., Tyther B., Calnan P., Ó Gallachóir B. *Impacts of Electric Vehicle charging under electricity market operations* (2013) Applied Energy, 101, pp. 93 - 102, Cited 247 times. DOI: 10.1016/j.apenergy.2012.06.052

Foley A.M., Heffron R.J., **Al Kez D.**, Furszyfer Del Rio D.D., McInerney C., **Welfle A**. *Restoring trust in ESG investing through the adoption of just transition ethics* (2024) Renewable and Sustainable Energy Reviews, 199, art. no. 114557, Cited 0 times. DOI: 10.1016/j.rser.2024.114557

Foley A.M., Leahy P.G., Li K., McKeogh E.J., Morrison A.P. *A long-term analysis of pumped hydro storage to firm wind power* (2015) Applied Energy, 137, pp. 638 - 648, Cited 95 times. DOI: 10.1016/j.apenergy.2014.07.020

Foley A.M., Leahy P.G., Marvuglia A., McKeogh E.J. *Current methods and advances in forecasting of wind power generation* (2012) Renewable Energy, 37 (1), pp. 1 - 8, Cited 1042 times. DOI: 10.1016/j.renene.2011.05.033

Foley A.M., Liu K., Roberts C., Wei Z., Clarke J.-P., Fang S. (2022) Energy, 246, art. no. 123393, Cited 0 times. DOI: 10.1016/j.energy.2022.123393

Foley A.M., Ó Gallachóir B.P., Hur J., Baldick R., McKeogh E.J. *A strategic review of electricity systems models* (2010) Energy, 35 (12), pp. 4522 - 4530, Cited 232 times. DOI: 10.1016/j.energy.2010.03.057

Foley A.M., Ó Gallachóir B.P., McKeogh E.J., Milborrow D., Leahy P.G. *Addressing the technical and market challenges to high wind power integration in Ireland* (2013) Renewable and Sustainable Energy Reviews, 19, pp. 692 - 703, Cited 73 times. DOI: 10.1016/j.rser.2012.11.039

Freer M., Gough C., **Welfle A.**, Lea-Langton A. *Carbon optimal bioenergy with carbon capture and storage supply chain modelling: How far is too far?* (2021) Sustainable Energy Technologies and Assessments, 47, art. no. 101406, Cited 16 times. DOI: 10.1016/j.seta.2021.101406

Freer M., Gough C., **Welfle A.**, Lea-Langton A. *Putting Bioenergy With Carbon Capture and Storage in a Spatial Context: What Should Go Where?* (2022) Frontiers in Climate, 4, art. no. 826982, Cited 9 times. DOI: 10.3389/fclim.2022.826982

Fuentes González F., Webb J., Sharmina M., Hannon M., **Braunholtz-Speight T.**, Pappas D. *Local energy businesses in the United Kingdom: Clusters and localism determinants based on financial ratios* (2022) Energy, 239, art. no. 122119, Cited 5 times. DOI: 10.1016/j.energy.2021.122119

Furszyfer Del Rio D.D., Sovacool B.K., **Foley A.M.**, Griffiths S., Bazilian M., Kim J., Rooney D. *Decarbonizing the glass industry: A critical and systematic review of developments, sociotechnical systems and policy options* (2022) Renewable and Sustainable Energy Reviews, 155, art. no. 111885, Cited 70 times. DOI: 10.1016/j.rser.2021.111885

Furszyfer Del Rio D.D., Sovacool B.K., Griffiths S., Bazilian M., Kim J., **Foley A.M.**, Rooney D. *Decarbonizing the pulp and paper industry: A critical and systematic review of sociotechnical developments and policy options* (2022) Renewable and Sustainable Energy Reviews, 167, art. no. 112706, Cited 63 times. DOI: 10.1016/j.rser.2022.112706

Gough C., Garcia-Freites S., Jones C., Mander S., Moore B., Pereira C., Röder M., Vaughan N., **Welfle A**. *Challenges to the use of BECCS as a keystone technology in pursuit of 1.5°C* (2018) Global Sustainability, 1, art. no. e5, Cited 78 times. DOI: 10.1017/sus.2018.3

Greening B., **Braunholtz-Speight T.**, Wood R., Freer M. *Batteries and beyond: Multi-vector energy storage as a tool to decarbonise energy services* (2023) Frontiers in Energy Research, 10, art. no. 1109997, Cited 3 times. DOI: 10.3389/fenrg.2022.1109997

Griffiths S., Sovacool B.K., Furszyfer Del Rio D.D., **Foley A.M.**, Bazilian M.D., Kim J., Uratani J.M. *Decarbonizing the cement and concrete industry: A systematic review of socio-technical systems, technological innovations, and policy options* (2023) Renewable and Sustainable Energy Reviews, 180, art. no. 113291, Cited 53 times. DOI: 10.1016/j.rser.2023.113291

Guerra K., **Welfle A.**, Gutiérrez-Alvarez R., Freer M., Ma L., Haro P. *The role of energy storage in Great Britain's future power system: focus on hydrogen and biomass* (2024) Applied Energy, 357, art. no. 122447, Cited 9 times. DOI: 10.1016/j.apenergy.2023.122447

Guerra K., **Welfle A.**, Gutiérrez-Alvarez R., Moreno S., Haro P. *Great Britain's power system with a high penetration of renewable energy: Dataset supporting future scenarios* (2024) Data in Brief, 53, art. no. 110113, Cited 0 times. DOI: 10.1016/j.dib.2024.110113

Hampton H., **Foley A.M**. *A review of current analytical methods, modelling tools and development frameworks applicable for future retail electricity market design* (2022) Energy, 260, art. no. 124861, Cited 22 times. DOI: 10.1016/j.energy.2022.124861

Hampton H., **Foley A.M**., Del Rio D.F., Smyth B., Laverty D., Caulfield B. *Customer engagement strategies in retail electricity markets: A comprehensive and comparative review* (2022) Energy Research and Social Science, 90, art. no. 102611, Cited 35 times. DOI: 10.1016/j.erss.2022.102611

Hampton H., **Foley A.M**., Del Rio D.F., Sovacool B. *Developing future retail electricity markets with a customer-centric focus* (2022) Energy Policy, 168, art. no. 113147, Cited 8 times. DOI: 10.1016/j.enpol.2022.113147

Hannon M., Cairns I., **Braunholtz-Speight T**., Hardy J., **McLachlan C**., Mander S., Sharmina M. *Carrots, sticks and sermons: Policies to unlock community energy finance in the United Kingdom* (2023) Energy Research and Social Science, 100, art. no. 103086, Cited 4 times. DOI: 10.1016/j.erss.2023.103086

Heffron R., **Foley A.M**. *Promote clean-energy transition in student education* (2022) Nature, 607 (7917), pp. 32, Cited 6 times. DOI: 10.1038/d41586-022-01823-8

Heffron R.J., **Foley A.M**., Furszyfer Del Rio D.D. *The role of justice is set to shift accountability and responsibility in the energy sector* (2024) Nature Energy, 9 (8), pp. 910 - 912, Cited 0 times. DOI: 10.1038/s41560-024-01544-4

Henry A., McCallum C., McStay D., Rooney D., Robertson P., **Foley A.M**. *Analysis of wind to hydrogen production and carbon capture utilisation and storage systems for novel production of chemical energy carriers* (2022) Journal of Cleaner Production, 354, art. no. 131695, Cited 21 times. DOI: 10.1016/j.jclepro.2022.131695

Henry A., McStay D., Rooney D., Robertson P., **Foley A.M**. *Techno-economic analysis to identify the optimal conditions for green hydrogen production* (2023) Energy Conversion and Management, 291, art. no. 117230, Cited 26 times. DOI: 10.1016/j.enconman.2023.117230

Higgins P., **Foley A.M**., Douglas R., Li K. *Impact of offshore wind power forecast error in a carbon constraint electricity market* (2014) Energy, 76, pp. 187 - 197, Cited 34 times. DOI: 10.1016/j.energy.2014.06.037

Higgins P., Li K., Devlin J., **Foley A.M**. *The significance of interconnector counter-trading in a security constrained electricity market* (2015) Energy Policy, 87, pp. 110 - 124, Cited 12 times. DOI: 10.1016/j.enpol.2015.08.023

Hoang A.T., **Foley A.M**., Nižetić S., Huang Z., Ong H.C., Ölçer A.I., Pham V.V., Nguyen X.P. *Energy-related approach for reduction of CO_2 emissions: A critical strategy on the port-to-ship pathway* (2022) Journal of Cleaner Production, 355, art. no. 131772, Cited 182 times. DOI: 10.1016/j.jclepro.2022.131772

Hoang A.T., Goldfarb J.L., **Foley A.M**., Lichtfouse E., Kumar M., Xiao L., Ahmed S.F., Said Z., Luque R., Bui V.G., Nguyen X.P. *Production of biochar from crop residues and its application for anaerobic digestion* (2022) Bioresource Technology, 363, art. no. 127970, Cited 59 times. DOI: 10.1016/j.biortech.2022.127970

Hoang P.H., Ozkan G., Badr P.R., Papari B., Edrington C.S., Zehir M.A., Hayes B., Mehigan L., **Al Kez D**., **Foley A.M**. *A Dual Distributed Optimal Energy Management Method for Distribution Grids With Electric Vehicles* (2022) IEEE Transactions on Intelligent Transportation Systems, 23 (8), pp. 13666 - 13677, Cited 10 times. DOI: 10.1109/TITS.2021.3126543

Holstead K., Taylor Aiken G., Eadson W., **Braunholtz-Speight T**. *Putting community to use in environmental policy making: Emerging trends in Scotland and the UK* (2018) Geography Compass, 12 (9), art. no. e12381, Cited 10 times. DOI: 10.1111/gec3.12381

Hoolohan C., **Bows-Larkin A**., **McLachlan C**., Falconer R., Soutar I., Suckling J., Varga L., Haltas I., Druckman A., Lumbroso D., Scott M., Gilmour D., Ledbetter R., McGrane S., Mitchell C., Yu D. *Engaging stakeholders in research to address water–energy–food (WEF) nexus challenges* (2018) Sustainability Science, 13 (5), pp. 1415 - 1426, Cited 88 times. DOI: 10.1007/s11625-018-0552-7

Hoolohan C., **McLachlan C**., Jones C., **Bows-Larkin A**., Birch C., Mander S., Broderick J. *Responding to the climate emergency: how are UK universities establishing sustainable workplace routines for flying and food?* (2021) Climate Policy, 21 (7), pp. 853 - 867, Cited 31 times. DOI: 10.1080/14693062.2021.1881426

Hoolohan C., **McLachlan C**., **Bows-Larkin A**. *'Aha' moments in the water-energy-food nexus: A new morphological scenario method to accelerate sustainable transformation* (2019) Technological Forecasting and Social Change, 148, art. no. 119712, Cited 44 times. DOI: 10.1016/j.techfore.2019.119712

Hoolohan C., **McLachlan C**., Mander S. *Trends and drivers of end-use energy demand and the implications for managing energy in food supply chains: Synthesising insights from the social sciences* (2016) Sustainable Production and Consumption, 8, pp. 1 - 17, Cited 20 times. DOI: 10.1016/j.spc.2016.06.002

Hoolohan C., Soutar I., Suckling J., Druckman A., **Bows-Larkin A**., **McLachlan C**. *Stepping-up innovations in the water–energy–food nexus: A case study of anaerobic digestion in the UK* (2019) Geographical Journal, 185 (4), pp. 391 - 405, Cited 21 times. DOI: 10.1111/geoj.12259

Horschig T., **Welfle A**., Billig E., Thrän D. *From Paris agreement to business cases for upgraded biogas: Analysis of potential market uptake for biomethane plants in Germany using biogenic carbon capture and utilization technologies* (2019) Biomass and Bioenergy, 120, pp. 313 - 323, Cited 38 times. DOI: 10.1016/j.biombioe.2018.11.022

Introduction: Understanding and triangulating approaches to energy supply controversy (2013) Low-Carbon Energy Controversies, pp. 3 - 13, Cited 0 times. DOI: 10.4324/9780203105153

Jaramillo A.F.M., Lopez-Lorente J., Laverty D.M., Brogan P.V., Velasquez S.H.H., Martinez-Del-Rincon J., **Foley A.M**. *Distributed Energy Resources Electric Profile Identification in Low Voltage Networks Using Supervised Machine Learning Techniques* (2023) IEEE Access, 11, pp. 19469 - 19486, Cited 3 times. DOI: 10.1109/ACCESS.2023.3247977

Jin T.-H., Park H., Chung M., Shin K.-Y., **Foley A.M**., Cipcigan L. *Review of virtual power plant applications for power system management and vehicle-to-grid market development* (2016) Transactions of the Korean Institute of Electrical Engineers, 65 (12), pp. 2251 - 2261, Cited 8 times. DOI: 10.5370/KIEE.2016.65.12.2251

Johnston B., **Al Kez D**., **Foley A.M**. *Assessing the effects of increasing offshore wind generation on marginal cost in the Irish electricity market* (2024) Applied Energy, 374, art. no. 123892, Cited 0 times. DOI: 10.1016/j.apenergy.2024.123892

Johnston B., **Foley A.M**., Doran J., Littler T. *Levelised cost of energy, A challenge for offshore wind* (2020) Renewable Energy, 160, pp. 876 - 885, Cited 87 times. DOI: 10.1016/j.renene.2020.06.030

Johnston B., **Foley A.M**., Doran J., Littler T., McAleer M. *Influence of input costs and levelised cost of energy on wind power growth* (2022) Journal of Cleaner Production, 373, art. no. 133407, Cited 6 times. DOI: 10.1016/j.jclepro.2022.133407

Kerr S., Watts L., Colton J., Conway F., Hull A., Johnson K., Jude S., Kannen A., MacDougall S., **McLachlan C**., Potts T., Vergunst J. *Establishing an agenda for social studies research in marine renewable energy* (2014) Energy Policy, 67, pp. 694 - 702, Cited 76 times. DOI: 10.1016/j.enpol.2013.11.063

Al Kez D., **Foley A.M**., Morrow D.J. *Analysis of Fast Frequency Response Allocations in Power Systems With High System Non-Synchronous Penetrations* (2022) IEEE Transactions on Industry Applications, 58 (3), pp. 3087 - 3101, Cited 20 times. DOI: 10.1109/TIA.2022.3160997

Kinsella L., Stefaniec A., **Foley A.M**., Caulfield B. *Pathways to decarbonising the transport sector: The impacts of electrifying taxi fleets* (2023) Renewable and Sustainable Energy Reviews, 174, art. no. 113160, Cited 20 times. DOI: 10.1016/j.rser.2023.113160

Kuriakose J., Jones C., Anderson K., **McLachlan C**., Broderick J. *What does the Paris climate change agreement mean for local policy? Downscaling the remaining global carbon budget to sub-national areas* (2022) Renewable and Sustainable Energy Transition, 2, art. no. 100030, Cited 12 times. DOI: 10.1016/j.rset.2022.100030

Bows-Larkin A., Hoolohan C., **McLachlan C**. *Embracing context and complexity to address environmental challenges in the water-energy-food nexus* (2020) Futures, 123, art. no. 102612, Cited 22 times. DOI: 10.1016/j.futures.2020.102612

Bows-Larkin A., Smith T., Wrobel P. *Shipping in changing climates* (2017) Marine Policy, 75, pp. 188 - 190, Cited 10 times. DOI: 10.1016/j.marpol.2016.05.033

Leahy P.G., **Foley A.M**. *Wind generation output during cold weather-driven electricity demand peaks in Ireland* (2012) Energy, 39 (1), pp. 48 - 53, Cited 30 times. DOI: 10.1016/j.energy.2011.07.013

Lou E.C.W., Lee A., **Welfle A**. *Greenhouse gases (GHG) performance of refurbishment projects – Lessons from UK higher education student accommodation case studies* (2017) Journal of Cleaner Production, 154, pp. 309 - 317, Cited 8 times. DOI: 10.1016/j.jclepro.2017.03.226

Lou E.C.W., Lee A., **Welfle A**., Abdullahi A.L. *Testing the Nexus between C&D waste management strategies & GHG emission performances: The case of UK student accommodation refurbishment projects* (2021) Journal of Building Engineering, 34, art. no. 101812, Cited 2 times. DOI: 10.1016/j.jobe.2020.101812

Lowans C., Furszyfer Del Rio D., Sovacool B.K., Rooney D., **Foley A.M**. *What is the state of the art in energy and transport poverty metrics? A critical and comprehensive review* (2021) Energy Economics, 101, art. no. 105360, Cited 59 times. DOI: 10.1016/j.eneco.2021.105360

Lowans C., Furszyfer Del Rio D.D., Cameron C., Ahmed F., **Al Kez D**., Brown A., Hampton H., **Foley A.M**. *Energy systems* (2022) Encyclopedia of Electrical and Electronic Power Engineering: Volumes 1-3, 1, pp. V1-413 - V1-425, Cited 2 times. DOI: 10.1016/B978-0-12-821204-2.00004-0

Mai T.-K., **Foley A.M**., McAleer M., Chang C.-L. *Impact of COVID-19 on returns-volatility spillovers in national and regional carbon markets in China* (2022) Renewable and Sustainable Energy Reviews, 169, art. no. 112861, Cited 9 times. DOI: 10.1016/j.rser.2022.112861

Malvaldi A., Weiss S., Infield D., Browell J., Leahy P., **Foley A.M**. *A spatial and temporal correlation analysis of aggregate wind power in an ideally interconnected Europe* (2017) Wind Energy, 20 (8), pp. 1315 - 1329, Cited 67 times. DOI: 10.1002/we.2095

Mander S., Anderson K., **Bows-Larkin A**., Gough C., Vaughan N. *The Role of Bio-energy with Carbon Capture and Storage in Meeting the Climate Mitigation Challenge: A Whole System Perspective* (2017) Energy Procedia, 114, pp. 6036 - 6043, Cited 32 times. DOI: 10.1016/j.egypro.2017.03.1739

Mander S., **McLachlan C**. *Public engagement in energy planning and its impact on low-carbon energy controversy* (2013) Low-Carbon Energy Controversies, pp. 199 - 224, Cited 1 times. DOI: 10.4324/9780203105153-19

Martin Almenta M., Morrow D.J., Best R.J., Fox B., **Foley A.M**. *An Analysis of Wind Curtailment and Constraint at a Nodal Level* (2017) IEEE Transactions on Sustainable Energy, 8 (2), pp. 488 - 495, Cited 21 times. DOI: 10.1109/TSTE.2016.2607799

Martin Almenta M., Morrow D.J., Best R.J., Fox B., **Foley A.M**. *Domestic fridge-freezer load aggregation to support ancillary services* (2016) Renewable Energy, 87, pp. 954 - 964, Cited 22 times. DOI: 10.1016/j.renene.2015.08.033

McIlwaine N., **Foley A.M**., Best R., Morrow D.J., **Al Kez D**. *Modelling the effect of distributed battery energy storage in an isolated power system* (2023) Energy, 263, art. no. 125789, Cited 10 times. DOI: 10.1016/j.energy.2022.125789

McIlwaine N., **Foley A.M**., **Al Kez D**., Best R., Lu X., Zhang C. *A Market Assessment of Distributed Battery Energy Storage to Facilitate Higher Renewable Penetration in an Isolated Power System* (2022) IEEE Access, 10, pp. 2382 - 2398, Cited 9 times. DOI: 10.1109/ACCESS.2021.3139159

McIlwaine N., **Foley A.M**., Morrow D.J., **Al Kez D**., Zhang C., Lu X., Best R.J. *A state-of-the-art techno-economic review of distributed and embedded energy storage for energy systems* (2021) Energy, 229, art. no. 120461, Cited 106 times. DOI: 10.1016/j.energy.2021.120461

McLachlan C. *Symbolic interpretations of wave energy in the UK: Surfers' perspectives* (2013) Renewable Energy and the Public: From NIMBY to Participation, pp. 275 - 288, Cited 1 times. DOI: 10.4324/9781849776707

McLachlan C. *Technologies in place: Symbolic interpretations of renewable energy* (2009) Sociological Review, 57 (SUPPL. 2), pp. 181 - 199, Cited 28 times. DOI: 10.1111/j.1467-954X.2010.01892.x

McLachlan C., Mander S. *What have facts got to do with it anyway?: Competing knowledge claims in low carbon energy controversy* (2013) Low-Carbon Energy Controversies, pp. 85 - 113, Cited 3 times. DOI: 10.4324/9780203105153

Mehigan L., **Al Kez D**., Collins S., **Foley A.M**., Ó'Gallachóir B., Deane P. *Renewables in the European power system and the impact on system rotational inertia* (2020) Energy, 203, art. no. 117776, Cited 66 times. DOI: 10.1016/j.energy.2020.117776

Moreno Jaramillo A.F., Laverty D.M., Morrow D.J., Martinez del Rincon J., **Foley A.M**. *Load modelling and non-intrusive load monitoring to integrate distributed energy resources in low and medium voltage networks* (2021) Renewable Energy, 179, pp. 445 - 466, Cited 41 times. DOI: 10.1016/j.renene.2021.07.056

Moreno Jaramillo A.F., Lopez-Lorente J., Laverty D., Martinez-Del-Rincon J., **Foley A.M**. *Identification of Distributed Energy Resources in Low Voltage Distribution Networks* (2021) Proceedings of 2021 IEEE PES Innovative Smart Grid Technologies Europe: Smart Grids: Toward a Carbon-Free Future, ISGT Europe 2021, Cited 6 times. DOI: 10.1109/ISGTEurope52324.2021.9639971

Moreno Jaramillo A.F., Lopez-Lorente J., Laverty D.M., Martinez-del-Rincon J., Morrow D.J., **Foley A.M**., *Effective identification of distributed energy resources using smart meter net-demand data* (2022) IET Smart Grid, 5 (2), pp. 120 - 135, Cited 11 times. DOI: 10.1049/stg2.12056

O'Keefe L., **McLachlan C**., Gough C., Mander S., **Bows-Larkin A**. *Consumer responses to a future UK food system* (2016) British Food Journal, 118 (2), pp. 412 - 428, Cited 55 times. DOI: 10.1108/BFJ-01-2015-0047

Randles S., Bows A. *Aviation, emissions and the climate change debate (2009)* Technology Analysis and Strategic Management, 21 (1), pp. 1 - 16, Cited 12 times. DOI: 10.1080/09537320802557194

Reckien D., Buzasi A., Olazabal M., Spyridaki N.-A., Eckersley P., Simoes S.G., Salvia M., Pietrapertosa F., Fokaides P., Goonesekera S.M., Tardieu L., Balzan M.V., de Boer C.L., De Gregorio Hurtado S., Feliu E., Flamos A., **Foley A.M**., Geneletti D., Grafakos S., Heidrich O., Ioannou B., Krook-Riekkola A., Matosovic M., Orru H., Orru K., Paspaldzhiev I., Rižnar K., Smigaj M., Szalmáné Csete M., Viguié V., Wejs A. *Quality of urban climate adaptation plans over time* (2023) npj Urban Sustainability, 3 (1), art. no. 13, Cited 27 times. DOI: 10.1038/s42949-023-00085-1

Reckien D., Flacke J., Dawson R.J., Heidrich O., Olazabal M., **Foley A.M**., Hamann J.J.-P., Orru H., Salvia M., de Gregorio Hurtado S., Geneletti D., Pietrapertosa F. *Climate change response in Europe: What's the reality? Analysis of adaptation and mitigation plans from 200 urban areas in 11 countries* (2014) Climatic Change, 122 (1-2), pp. 331 - 340, Cited 264 times. DOI: 10.1007/s10584-013-0989-8

Roberts T., Upham P., Boucher P., **McLachlan C**., Mander S., Gough C., Ghanem D.A. *Conclusions and a research agenda for the social science of energy supply controversy* (2013) Low-Carbon Energy Controversies, pp. 259 - 265, Cited 1 times. DOI: 10.4324/9780203105153

Roberts T., Upham P., **McLachlan C**., Mander S., Gough C., Boucher P., Ghanem D.A. *Introduction: Understanding and triangulating approaches to energy supply controversy* (2013) Low-Carbon Energy Controversies, pp. 3 - 13, Cited 0 times. DOI: 10.4324/9780203105153-8

Röder M., Thornley P., Campbell G., **Bows-Larkin A**. *Emissions associated with meeting the future global wheat demand: A case study of UK production under climate change constraints* (2014) Environmental Science and Policy, 39, pp. 13 - 24, Cited 20 times. DOI: 10.1016/j.envsci.2014.02.002

Salvia M., Reckien D., Pietrapertosa F., Eckersley P., Spyridaki N.-A., Krook-Riekkola A., Olazabal M., De Gregorio Hurtado S., Simoes S.G., Geneletti D., Viguié V., Fokaides P.A., Ioannou B.I., Flamos A., Csete M.S., Buzasi A., Orru H., de Boer C., **Foley A.M**., Rižnar K., Matosović M., Balzan M.V., Smigaj M., Baštáková V., Streberova E., Šel N.B., Coste L., Tardieu L., Altenburg C., Lorencová E.K., Orru K., Wejs A., Feliu E., Church J.M., Grafakos S., Vasilie S., Paspaldzhiev I., Heidrich O. *Will climate mitigation ambitions lead to carbon neutrality? An analysis of the local-level plans of 327 cities in the EU* (2021)

Renewable and Sustainable Energy Reviews, 135, art. no. 110253, Cited 329 times. DOI: 10.1016/j.rser.2020.110253

Scott M., **Bows-Larkin A**. *Geography and the water–energy–food nexus: Introduction* (2019) Geographical Journal, 185 (4), pp. 373 - 376, Cited 7 times. DOI: 10.1111/geoj.12331

Shackley S., Gough C., **McLachlan C**. *The public perceptions of carbon dioxide capture and storage in the UK* (2005) Greenhouse Gas Control Technologies, pp. 1699 - 1704, Cited 3 times. DOI: 10.1016/B978-008044704-9/50199-3

Shackley S., **McLachlan C**. *Trade-offs in assessing different energy futures: a regional multi-criteria assessment of the role of carbon dioxide capture and storage* (2006) Environmental Science and Policy, 9 (4), pp. 376 - 391, Cited 27 times. DOI: 10.1016/j.envsci.2006.01.006

Shackley S., **McLachlan C**., Gough C. *The public perception of carbon dioxide capture and storage in the UK: Results from focus groups and a survey* (2004) Climate Policy, 4 (4), pp. 377 - 398, Cited 119 times. DOI: 10.1080/14693062.2004.9685532

Sharmina M., Hoolohan C., **Bows-Larkin A**., Burgess P.J., Colwill J., Gilbert P., Howard D., Knox J., Anderson K. *A nexus perspective on competing land demands: Wider lessons from a UK policy case study* (2016) Environmental Science and Policy, 59, pp. 74 - 84, Cited 63 times. DOI: 10.1016/j.envsci.2016.02.008

Sharmina M., McGlade C., Gilbert P., **Bows-Larkin A**. *Global energy scenarios and their implications for future shipped trade* (2017) Marine Policy, 84, pp. 12 - 21, Cited 36 times. DOI: 10.1016/j.marpol.2017.06.025

Shi M., Lu X., Jiang H., Mu Q., Chen S., Fleming R.M., Zhang N., Wu Y., **Foley A.M**. *Opportunity of rooftop solar photovoltaic as a cost-effective and environment-friendly power source in megacities* (2022) iScience, 25 (9), art. no. 104890, Cited 9 times. DOI: 10.1016/j.isci.2022.104890

Sovacool B.K., Bazilian M., Griffiths S., Kim J., **Foley A.M**., Rooney D. *Decarbonizing the food and beverages industry: A critical and systematic review of developments, sociotechnical systems and policy options* (2021) Renewable and Sustainable Energy Reviews, 143, art. no. 110856, Cited 105 times. DOI: 10.1016/j.rser.2021.110856

Tomos B.A.D., Stamford L., **Welfle A**., **Bows-Larkin A**. *Decarbonising international shipping – A life cycle perspective on alternative fuel options* (2024) Energy Conversion and Management, 299, art. no. 117848, Cited 11 times. DOI: 10.1016/j.enconman.2023.117848

Vaughan N.E., Gough C., Mander S., Littleton E.W., **Welfle A**., Gernaat D.E.H.J., Van Vuuren D.P. *Evaluating the use of biomass energy with carbon capture and storage in low emission scenarios* (2018) Environmental Research Letters, 13 (4), art. no. 044014, Cited 85 times. DOI: 10.1088/1748-9326/aaaa02

Walsh C., Lazarou N.-J., Traut M., Price J., Raucci C., Sharmina M., Agnolucci P., Mander S., Gilbert P., Anderson K., **Bows-Larkin A**., Smith T. *Trade and trade-offs: Shipping in changing climates* (2019) Marine Policy, 106, art. no. 103537, Cited 18 times. DOI: 10.1016/j.marpol.2019.103537

Walsh C., Mander S., **Bows-Larkin A**. *Charting a low carbon future for shipping: A UK perspective* (2017) Marine Policy, 82, pp. 32 - 40, Cited 29 times. DOI: 10.1016/j.marpol.2017.04.019

Wang S., Chen N., Yu D., **Foley A.M**., Zhu L., Li K., Yu J. *Flexible fault ride through strategy for wind farm clusters in power systems with high wind power penetration* (2015) Energy Conversion and Management, 93, pp. 239 - 248, Cited 39 times. DOI: 10.1016/j.enconman.2015.01.022

Wang X., Ghanem D.A., **Bows-Larkin A**., **McLachlan C**. *How the meanings of 'home' influence energy-consuming practices in domestic buildings* (2021) Energy Efficiency, 14 (1), art. no. 1, Cited 5 times. DOI: 10.1007/s12053-020-09910-3

Wang X.-C., **Foley A.M**., Fan Y.V., Nižetić S., Klemeš J.J. *Integration and optimisation for sustainable industrial processing within the circular economy* (2022) Renewable and Sustainable Energy Reviews, 158, art. no. 112105, Cited 11 times. DOI: 10.1016/j.rser.2022.112105

Wang X.-C., Klemeš J.J., Wang Y., **Foley A.M**., Huisingh D., Guan D., Dong X., Varbanov P.S. *Unsustainable imbalances and inequities in Carbon-Water-Energy flows across the EU27* (2021)

Renewable and Sustainable Energy Reviews, 138, art. no. 110550, Cited 25 times. DOI: 10.1016/j.rser.2020.110550

Welfle A., Alawadhi A. *Bioenergy opportunities, barriers and challenges in the Arabian Peninsula – Resource modelling, surveys & interviews* (2021) Biomass and Bioenergy, 150, art. no. 106083, Cited 14 times. DOI: 10.1016/j.biombioe.2021.106083

Welfle A., Gilbert P., Thornley P. *Increasing biomass resource availability through supply chain analysis* (2014) Biomass and Bioenergy, 70, pp. 249 - 266, Cited 66 times. DOI: 10.1016/j.biombioe.2014.08.001

Welfle A., Gilbert P., Thornley P. *Securing a bioenergy future without imports* (2014) Energy Policy, 68, pp. 1 - 14, Cited 55 times. DOI: 10.1016/j.enpol.2013.11.079

Welfle A., Gilbert P., Thornley P., Stephenson A. *Generating low-carbon heat from biomass: Life cycle assessment of bioenergy scenarios* (2017) Journal of Cleaner Production, 149, pp. 448 - 460, Cited 55 times. DOI: 10.1016/j.jclepro.2017.02.035

Welfle A., Röder M. *Mapping the sustainability of bioenergy to maximise benefits, mitigate risks and drive progress toward the Sustainable Development Goals* (2022) Renewable Energy, 191, pp. 493 - 509, Cited 19 times. DOI: 10.1016/j.renene.2022.03.150

Welfle A., Thornley P., Röder M. *A review of the role of bioenergy modelling in renewable energy research & policy development* (2020) Biomass and Bioenergy, 136, art. no. 105542, Cited 75 times. DOI: 10.1016/j.biombioe.2020.105542

Welfle A., Almena A., Arshad M.N., Banks S.W., Butnar I., Chong K.J., Cooper S.G., Daly H., Garcia Freites S., Güleç F., Hardacre C., Holland R., Lan L., Lee C.S., Robertson P., Rowe R., Shepherd A., Skillen N., Tedesco S., Thornley P., Verdía Barbará P., Watson I., Williams O.S.A., Röder M. *Sustainability of bioenergy – Mapping the risks & benefits to inform future bioenergy systems* (2023) Biomass and Bioenergy, 177, art. no. 106919, Cited 9 times. DOI: 10.1016/j.biombioe.2023.106919

Welfle A., Chingaira S., Kassenov A. *Decarbonising Kenya's domestic & industry Sectors through bioenergy: An assessment of biomass resource potential & GHG performances* (2020) Biomass and Bioenergy, 142, art. no. 105757, Cited 21 times. DOI: 10.1016/j.biombioe.2020.105757

Wongsirichot P., Costa M., Dolman B., Freer M., **Welfle A**., Winterburn J. *Food processing by-products as sources of hydrophilic carbon and nitrogen for sophorolipid production* (2022) Resources, Conservation and Recycling, 185, art. no. 106499, Cited 18 times. DOI: 10.1016/j.resconrec.2022.106499

Wood F.R., Bows A., Anderson K. *Apportioning aviation CO2 emissions to regional administrations for monitoring and target setting* (2010) Transport Policy, 17 (4), pp. 206 - 215, Cited 20 times. DOI: 10.1016/j.tranpol.2010.01.010

Yang C., Bu S., Fan Y., Wan W.X., Wang R., **Foley A.M**. *Data-driven prediction and evaluation on future impact of energy transition policies in smart regions* (2023) Applied Energy, 332, art. no. 120523, Cited 7 times. DOI: 10.1016/j.apenergy.2022.120523

Zaky A.S., Kumar S., **Welfle A**. *Integrated approaches and future perspectives* (2022) Waste-to-Energy: Recent Developments and Future Perspectives towards Circular Economy, pp. 613 - 651, Cited 4 times. DOI: 10.1007/978-3-030-91570-4_20

Zhang C., Lu X., Chen S., Shi M., Sun Y., Wang S., Zhang S., Fang Y., Zhang N., **Foley A.M**., He K. *Synergies of variable renewable energy and electric vehicle battery swapping stations: Case study for Beijing* (2024) eTransportation, 22, art. no. 100363, Cited 0 times. DOI: 10.1016/j.etran.2024.100363

Zhang C., Lu X., Ren G., Chen S., Hu C., Kong Z., Zhang N., **Foley A.M**. *Optimal allocation of onshore wind power in China based on cluster analysis (*2021) Applied Energy, 285, art. no. 116482, Cited 35 times. DOI: 10.1016/j.apenergy.2021.116482