The House of Lords Environment and Climate Change Committee Inquiry into behaviour change in the context of climate change and the environment

Written evidence jointly prepared and submitted by the researchers based at the University of St Andrews' Centre for Energy Ethics (CEE).

Dr Sean Field is a Research Fellow at the CEE. He is an economic anthropologist with a background in economic geography, applied economics and business. For the last decade, his work has focused on the role of the financial sector in driving resource extraction, the calculation of risk, and the valuation of energy resources and technologies. With financial sector and consultant experience, he brings unique insights into the role of the sector in enabling and supporting behaviour change in energy transitions.

Dr Mette High is a Reader in Social Anthropology and Director of the CEE. She has extensive research experience in economic anthropology and anthropology of energy, focussing on energy industries, commodity markets and global finance. She leads a six-year European Research Council funded project: The Ethics of Oil: Finance Moralities and Environmental Politics in the Global Oil Economy, combining her expertise in the financial characteristics of energy markets with nuanced considerations of ethical dimensions of energy systems.

Dr Emilka Skrzypek is a Senior Policy Fellow at the CEE and Honorary Research Fellow at the Centre for Social Responsibility in Mining, University of Queensland. With over a decade of experience in conducting social science research on resource extraction, she has focused on engaging with communities, companies and governments. Her research expertise is complemented by her work with the Scottish Government's Strategic Research and Analysis Team as well as in the international NGO sector.

The Centre for Energy Ethics at the University of St Andrews brings together 81 energy researchers across all disciplines to address the challenge of how to balance our energy demands with concerns for anthropogenic climate change. More information about the Centre can be found at: energyethics.st-andrews.ac.uk.

This submission responds to the call for evidence Question R: What role is there for the financial sector in supporting or enabling behaviour change?

1. Executive Summary

1.1. The financial sector has a key role to play in supporting and enabling behaviour change to achieve a societal shift from fossil fuels toward renewable energy generation and infrastructure (REGI).

1.2. Debt-based solutions, such as bonds and commercial loans, alone, are insufficient to fund a timely transition toward REGI and to deliver affordable and accessible energy supply choices for UK households and businesses.

1.3. Evidence from other jurisdictions demonstrates the important role played by equity capital in ushering in energy transitions.

1.4. Evidence from other jurisdictions also demonstrates that tax incentives are effective mechanisms for incentivising equity capital investment in REGI.

1.5. The UK Government has an opportunity to initiate a novel and timely public-oriented private equity scheme that invites members of the public to participate and become equity stakeholders in the UK's energy future.

1.6. We argue this scheme would facilitate behaviour change by crucially enabling public buy-in for a society-wide REGI transition and leading to a new kind of UK energy democracy.

2. Key Definitions

2.1 **Bonds** are a form of debt. It is a financial instrument that represents a loan by the bond purchaser to the bond issuer. Governments and corporations issue bonds as means of borrowing money. Bonds typically have interest rates paid to the bond holder and have end dates when the principal is due to be paid back to the purchaser. Bonds are rated by credit agencies judging the credit worthiness of issuers and can be traded on markets.

2.2 **Equity** denotes an ownership stake in a company. If a company (and all its assets) was liquidated, equity owners would receive a proportion of the net value of the company's assets according to the ownership stake they held. If a company was sold to new owners, equity holders would receive a proportion of the value that the company was sold for (minus fees etc.) according to their % equity ownership in the company.

2.3 **Institutional investors** include pension plans, insurance companies, sovereign wealth funds, endowments, hospitals, trusts, universities and foundations that have large sums of pooled capital to invest.

2.4 **Private equity** means having an ownership stake in a private company. By contrast with owning stocks in publicly traded companies that can be bought and sold on stock markets, shares in private companies can only be directly purchased from and sold by the owners of those companies. Private equity firms are companies that specialise in buying, selling and (in some cases) creating private firms using capital from institutional investors and high net worth clients.

3. The Problem

3.1. Former Bank of England Governor and UN Special Envoy for Climate Action and Finance, Mark Carney, suggests that financial infrastructures are vital to addressing climate change and transitioning away from fossil fuels (Pomeroy 2021). In this vein, Bloomberg (2020) estimates that a global transition to a world powered by renewable energy will require

"between $78 trillion and $130 trillion of new investment between now and 2050 to cover growth in electricity generation and the power grid".

3.2. Facilitating societal behaviour change for a just energy transition requires making renewable energy choices **accessible** and **affordable** for households and businesses, as well as recognising households as not just consumers but also as **participants in co-creating energy systems**.

3.3. A society-wide roll-out of REGI will be needed but it currently remains underfunded. But **how** will this be achieved and **who** will cover this cost?

3.4. Existing Government grants and subsidies, such as the Renewable Energy Innovation Project and the Net Zero Innovation Portfolio, have played (and continue to play) an important part in providing seed capital for developing and establishing REGI in the UK. However, they have been insufficient for its rapid large-scale deployment (Government 2017, 2021a, 2021b). UK Government-backed loans for the upscaling of REGI have also played an important role but have provided limited capital to date (Edie 2021).

3.5. Globally, private sector financing has driven the development of utility-scale[i] REGI. Evidence indicates that, on average, private project developers provide about 50% of the capital required, followed by commercial and investment bank loans (25%) and government funding (14%). Institutional investors, individuals and other sources make up the remaining 11% (CPI & IRENA 2020).

3.6. As the data above suggests, debt-based finance provides part of the capital needed for REGI, but not enough. Commercial lenders often deem these projects too financially risky and not profitable enough to provide additional capital.

3.7. There has been growing interest among private and institutional investors in 'climate' and 'sustainable' bonds, which have emerged as a major asset class through which private capital can invest in REGI (CBI 2021, Langely et al. 2021). The global market for these bonds has grown by an astonishing 49% over the last five years and bond issuances are expected to surpass $1 trillion USD by 2023 (Jones 2021). While remarkable, this new category of bonds has yet to materialise a substantive deployment of REGI.

3.8. Thus, commercial lending and bonds have failed to ignite a rapid and society-wide energy transition in the UK and beyond because:

- Lenders perceive a higher risk of default with new REGI projects and thus demand higher interest rates, making loans financially unviable for borrowers.

- While rapidly expanding, the bond market has not yet provided the capital required for widespread utility-scale REGI.

- Financial incentives associated with debt-based instruments do not align with the development of new REGI. If a project fails to meet its financial-actuarial targets, bond holders and lenders risk not being paid. By contrast, if a project is financially

successful, then bond holders and lenders receive their agreed payments and nothing more.

These financial realities have been confirmed by researchers at the Centre for Energy Ethics and our colleagues at the University of St Andrews' Hydrogen Accelerator (H2A 2021).

3.9. Collectively, the data presented above indicate that new approaches to financing REGI are needed to meet the UK Government's goal of reaching net zero by 2050.

4. Financing the Shift: From the US Shale Revolution to a US Renewable Transition

4.1 There are **important financial lessons** for renewable energy transitions that can be learned from other energy sectors, such as the oil and gas sector, as well as from other countries such as the US. The below case study from the US contains transferrable lessons that can inform a rapid energy transition away from fossil fuels and the development of REGI, illustrating how equity capital can usher in an energy revolution in the UK. It shows:

- That **equity sources of capital were the impetus** for the rapid large-scale deployment of new energy technology and is now leading the rapid large-scale REGI transition in the US.

- That **equity investors stand to benefit** from the full economic successes of energy production technologies, whereas debt-based capital providers (lenders and bond holders) stand to benefit only within the parameters of their repayment contract schedules.

- That the UK Government can **encourage equity capital investment in REGI** through tax incentive structures observed in the US.

4.2 Private investors have played a fundamental role in the US oil industry since it was founded. Commercial lending has been an important source of capital for oil and gas companies, but they continue to be reliant on private investors because lenders deem new extraction projects to be too risky to lend toward.

4.3 Since the late-1990s, private equity firms have been vital to connecting institutional investors around the world with private US oil and gas companies. US hydrocarbon-focussed private equity firms are akin to venture capitalists and invest in smaller start-up companies and new production projects. This distinguishes them from the larger private equity sector, which has historically preferred large mature corporations (Souleles 2019). Private equity funded firms led the US shale revolution by deploying new, but proven, unconventional hydrocarbon extraction technology across the United States (Field 2022, High 2022).

4.4 Between 2015 and 2019, private equity firms invested $44 billion USD from institutional investors into the unconventional US oil and gas sector (Flowers 2019). Some large private equity firms in this sector raised multibillion dollar funds: Blackstone raised a $4.5 billion USD energy fund in February 2015, only three years after raising a fund of $2.4 billion USD

(Kumar 2015), and EnCap raised its 20th fund (Capital Fund XI), worth $7 billion USD in 2017 (EnCap 2021).

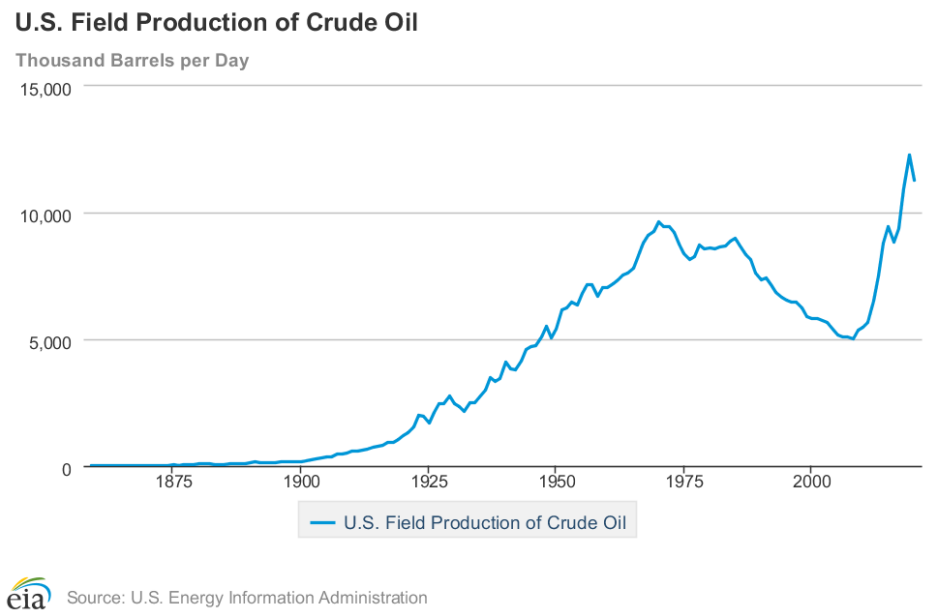

Figure 1: US Crude Oil Production. Source: USEIA 2021a.

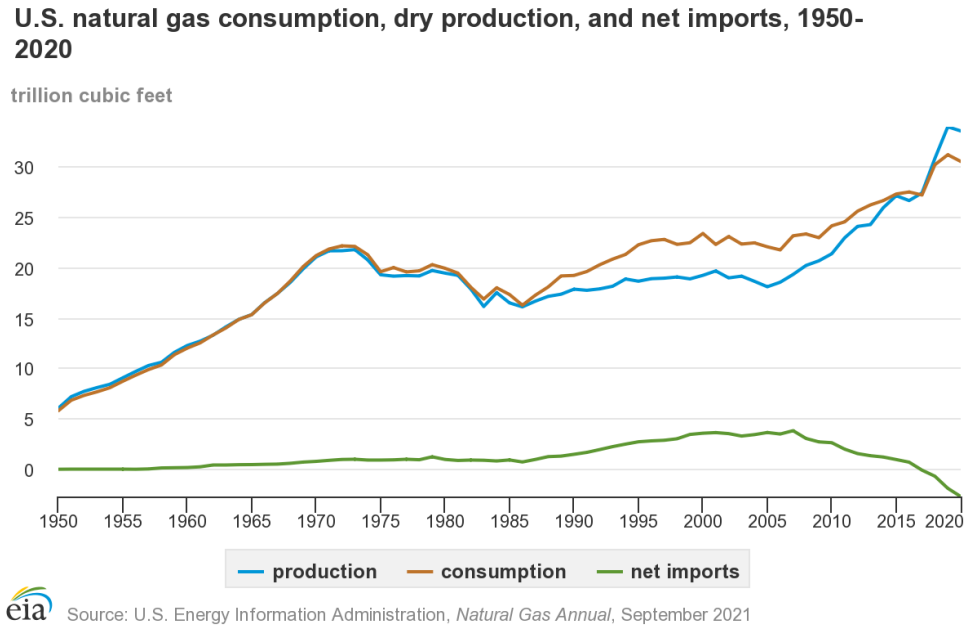

Figure 2: US Natural Gas Production. Source: USEIA 2021b.

4.5 The collective impact of this investment was fundamental and transformative (see Fig. 1. and Fig. 2) Between the 1970s and 2000s, the US was a declining producer and a net importer of

oil. Since then, the US has become the world's largest producer of oil and natural gas, followed by Saudi Arabia and Russia respectively, as well as a net exporter of oil and gas (Worldometers 2021a, 2021b). This production growth can be attributed to unconventional production that was financed by private equity investors (McLean 2016).

4.6 On-going research by the authors indicate that private equity firms were crucial to the US shale revolution because they filled an investment gap in the market (Field 2022). They enabled investors to take a direct equity stake in the development of energy resources, while providing much needed investment capital to firms actively deploying new, but proven, energy production technologies.

4.7 Some of these same private equity firms are now filling the market gap in REGI investment (see Fig. 3). For example, EnCap, a leading Texas-based private equity firm that played a central role in the US shale revolution, recently raised a $1.2 billion USD Energy Transition fund for investment in wind and solar energy generation and battery storage technology (Business Wire 2021, EnCap 2021). One of the firms it invested in, Solar Proponent, is a Texas-based utility-scale solar developer that is currently constructing two large solar projects in the state (Solar Proponent 2021). Other key private equity firms that have turned their attention from investing in oil and gas to focus on investing in REGI include Kayne Anderson and Natural Gas Partners. Unlike lenders and bond holders, equity owners stand to receive the full economic benefits (i.e. profits) generated by this REGI.[ii]

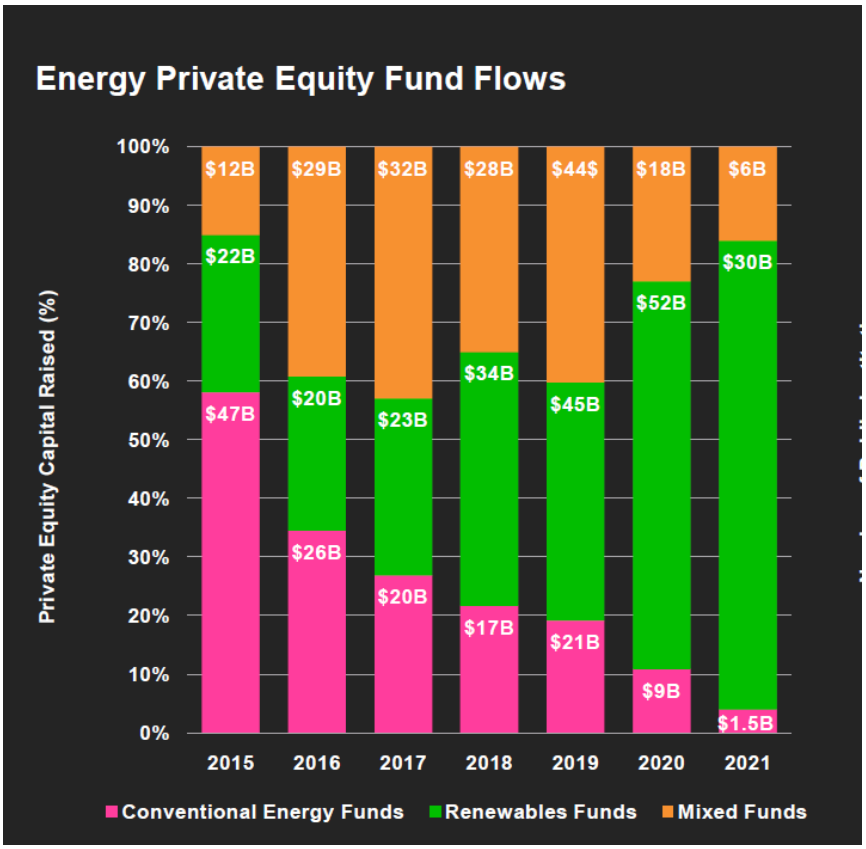

Figure 3: Energy Focused Private Equity Funds. Source: Enverus 2021.

4.8 Texas currently leads the US in the implementation of REGI (USEIA 2021c). In 2020, the state was the top US producer of utility-scale wind generated electricity, accounting for 30% of total US production, and it was the second largest producer of utility-scale solar electricity after California (USEIA 2021c).

4.9 Equity investors also benefit from US and Texas commercial tax incentives that encourage the rapid deployment of utility-scale REGI (Looper 2020). These incentives include:

- The Investment Tax Credit (ITC) that allows commercial operations to deduct 26% of the cost of installing solar energy systems from their federal taxes.
- The Modified Accelerated Cost Recovery System (MACRS) that allows firms to recover investments in solar, wind, and geothermal property through depreciation deductions.
- The Texas property tax code allowance that permits 100% of the appraised property value *increase* arising from the installation or construction of a solar or wind-powered energy infrastructure.

These government incentives reduce the extent to which investment capital is eroded by state and federal taxes, thus increasing the financial returns paid to equity owners.

5. New Pathways to Delivering on Net Zero: Investing Equity Capital into UK REGI

5.1 The above evidence from the US is indicative of the transformative power of equity capital and highlights how private equity firms emerged to fill a gap in the investment market. This financial structure connected institutional investors with small and medium firms' need for capital. Private equity firms, however, only serve a particular market segment: institutional and high-net worth investors. **This leaves other market segments, particularly individual and household investors, under-served**.

5.2 Currently, there are several ways for individuals and households to invest in REGI. These include:

- Investing in bonds (pt. 3.7)
- Investing in individual companies
- Investing in index funds that invest in a portfolio of companies and/or bonds

These existing investment options link investors with REGI, but in limited and indirect ways as debt providers and as company and fund shareholders. As such, they provide a limited financial and social connection between the public and the deployment of REGI and thus have limited impact on behaviour change.

5.3 The UK Government's expert advisor on public engagement with net zero, Dr Christina Demski, recently argued that delivering on the Government's plan to reach net zero "is a

social as well as a technical challenge" and that "public buy-in and cooperation… [are] an important part of technological change" (Demski 2021: 4-5).

5.4 Research supports Dr Demski's conclusions. Inclusive and meaningful public participation in energy policy and climate action, including large-scale energy infrastructures, are essential to crafting climate change mitigation solutions that garner enthusiasm and avoid public backlash (Patterson & Brisbois 2021). This means **engaging with people as more than consumers**.

5.5 Recruiting public support for achieving net zero has largely focused on consumer demand-oriented behaviour changes. From reducing energy consumption to adopting more energy efficient technologies and energy switching (e.g. from natural gas to electric), these behaviour changes have been supported by government policies such as a ban on future gas boilers, a ban on new future diesel/petrol vehicles, and the availability of more energy smart appliances (Government 2021c, Government 2021d).

5.6 Public engagement and participation in the roll-out of REGI across the UK has, and continues to be, largely confined to investments in the installation of residential and consumer-scale solar and wind projects. Since 2015, residential solar installations in the UK have slowed after the government subsidy supporting them was eliminated, though new programs have since been introduced to supplement their installation (Ambrose 2019, Government 2019). While important, these REGI projects are not utility-scale.

5.7 Collectively, this evidence indicates that **there is a gap in the consumer equity investment market**. Amid growing concern about climate change, there is public support for new utility-scale REGI but few avenues for members of the public to engage with and participate in its materialisation. Existing options for households to invest in REGI **do not sufficiently solicit public buy-in** in how the UK reaches net zero.

5.8 This is a key area where the UK Government has an opportunity to intervene. Instigating an equity-based financial infrastructure designed and marketed to households interested in participating in and shaping the deployment of new utility-scale UK REGI projects. Such a scheme would:

- Provide a **direct social and financial link** between households and new REGI projects by giving them an ownership stake in these projects.
- Be **financially accessible** to large swaths of the UK population by having a low threshold for minimum shareholder investment (e.g. £20-£50).[iii]
- Garner the **public support and buy-in** needed for the implementation of utility-scale REGI

This type of equity capital investment infrastructure would invite households to participate directly in the kinds of REGI implemented in the UK, enabling a **new kind of UK energy democracy**. This financial infrastructure could have a potentially transformative effect on the UK's energy infrastructure by unleashing capital distributed across households in the UK and appealing to them to shape the UK's energy future.

6. Recommendations

6.1 In order to meet the UK Government's target of reaching net zero by 2050, private and/or public investment in renewable energy generation and infrastructure is needed. Based on the evidence presented here, we recommend:

i. That the Government closely examine other jurisdictions, such as the US, for lessons to be learned on how the UK can foster and incentivise private investment in utility-scale REGI projects.

ii. That the Government closely examine tax incentive structures from other jurisdictions, such as the US, that can be adopted to incentivise investment in REGI in the UK.

iii. That the Government consult with equity firms and other stakeholders within and outside of the UK, for advice on how to best incentivise the public to take ownership stake in UK renewable energy generation.

iv. That the Government instigate equity-based financial infrastructures designed with low entry thresholds to encourage broad and inclusive participation in REGI projects in an effort ensure public support for the UK's net zero journey.

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Notes:

[i] We use "utility-scale" to refer to large industrial sized facilities and infrastructures and to distinguish these from household, residential, and small commercial solar and wind infrastructures meant to supply single buildings and localised demand.

[ii] The development of commercial utility-scale REGI in Texas is also being driven by investments by large energy producers (such as Orsted and Enel SpA) and multisector companies such as Facebook (Saul & Eckhouse 2021, Associated Press 2019). The amount of equity investment in these developments is not clear but is reportedly significant. Facebook energy strategy manager, Peter Freed, reported for example that the company is investing a "significant" portion of the total costs of the project, which is valued at over $500 million (Peters 2019).

[iii] Zero cost equity ownership options for the very lowest income earners would ensure greater participation and broader social inclusion.