Rethinking the political economy of environmental conflict: Lessons from the UK fracking controversy

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Rethinking the political economy of environmental conflict: Lessons from the UK fracking controversy

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Declaration

I declare that this thesis and the work contained herein has been generated by me except where explicitly stated otherwise in the text, with due reference to the literature, acknowledgement of collaborative research, and in accordance with the Institutional Code of Practice and Research Degree Regulations.

Some of this thesis' analysis and arguments are already in the public domain. Alongside the capitalaspower.com online forum, where I have previously discussed my emerging quantitative findings with other researchers, some arguments presented in this thesis have previously featured in the following individually authored blog piece, co-authored research article, and co-authored report:

Marshall, A. (2023). *Environmental conflict, capital as power…and a nice trip to London*. Manchester Metropolitan University. [Online] Accessed on 20th November 2023] https://www.manmetpgr.co.uk/blog/05-2023/environmental-conflict-capital-as-powerand-a-nice-trip-to-london/

Lloveras, J., **Marshall, A.P.**, Warnaby, G. and Kalandides, A., (2021). Mobilising sense of place for degrowth? Lessons from Lancashire's anti-fracking activism. *Ecological Economics*, *183*, p.106754. https://postgrowth-lab.webs.uvigo.es/wp-content/uploads/2022/04/Mobilising-sense-of-place-for-degrowth_Lessons-from-Lancashires-anti-fracking-activism.pdf

Barrett, T., Bréau, M., Caiati, G., Healy, A., Heinisch, K., Holtemöller O., **Marshall, A.P**, Norris, L., Škobla, D., Singh, N., Schult, C. (2022). South Wales Region Case Study Report. WP4 – Deliverable 4.6 of ENergy TRANsitions from Coal and carbon: Effects on Societies (ENTRANCES), Funded by the European Union's Horizon 2020 Research and Innovation Programme (No. 883947). Available at: https://entrancesproject.eu/wp-content/uploads/2022/12/D4.6-South-Wales-Case-Study-Report.pdf

Signed: A. Marshall

Dedication

To James and Thomas

Abstract

As governments and corporations have intensified their efforts to locate, extract, and capitalise oil, gas, and various other biophysical materials, the world has simultaneously witnessed a proliferation of social resistance to these efforts. While taking many forms, such resistance, and concomitant ecological distribution conflicts (EDCs), are invariably motivated by a diverse range of objections regarding the unequal distributions of power, harms, and benefits associated with these extractive endeavours. This thesis primarily addresses the EDC literature, an environmental justice activist orientated literature at the intersection of ecological economics and political ecology. Despite offering numerous insights regarding the socio-metabolic drivers of EDCs, this literature often tends towards problematic explanations regarding the role of capitalist power. Thus, while these explanations foreground questions of capitalist power, their core assumptions - especially the analytical distinction between 'the political' and 'the economic'- serve to elide key aspects of capitalist power within this context. Moreover, they also tend to obscure an important counterpart to capitalist power of special relevance to the activists who mobilise for environmental justice within EDCs; namely, capitalist vulnerability. Consequently, this thesis enfolds existing EDC insights within a broader theoretical framework underpinned by the Capital as Power (CasP) approach to political economy. CasP's overarching contribution is to enable researchers to map how intra-capitalist conflicts unfold through the reorganisation of social ecological relations. Mobilising this framework, and a unique combination of qualitative and quantitative methods in the context of the UK fracking conflict (2010-2020), this thesis aims to explore, understand, and explain capitalist power and vulnerability in fracking conflicts (specifically) and EDCs (generally). Alongside other key findings, the inherent uncertainty surrounding future earnings and the divergent interests of competing capitalist coalitions are identified as key sources of capitalist vulnerability that environmental justice activists can exploit within EDCs. These findings highlight the analytical benefits of a CasP-driven theoretical framework for elucidating capitalist power and vulnerability in fracking conflicts and EDCs, not only for activists and academics, but also for policy makers, businesses, and other advocates for just transformations towards sustainability.

Acknowledgements

My wonderful partner, Sammy, who has shouldered more than most on account of this PhD thesis, merits a special mention for her unwavering support throughout this (longer than expected!) journey. Much has changed since 2016; not all for the better, but we have endured and are now responsible for two increasingly not so little humans. Although the PhD disrupted family life more than necessary, the time spent with you, James, and Thomas provided welcome relief from this frequently all-consuming project. Thank you does not even begin to cover it!

I am also immensely grateful to all my research participants from the UK anti-fracking movement who generously gave their time, knowledge, and experience to this project. This thesis owes its existence to you and your inspirational struggle(s) for a better tomorrow!

I would also like to thank my fantastic supervisory team, Gary Warnaby, Javier Lloveras, and Chloe Steadman, for all their kindness, wisdom, and support. Chloe, you joined the team relatively late in my PhD journey, but this thesis is all the better for your critical input and sharp eye. Gary, what can I say! Since coming on board in mid-2018, you have been a calming and reassuring presence. Especially in the final months when you went above and beyond to shepherd me over the finishing line. Javi, you have been there from the beginning (through all the ups and downs!), both as a supervisor and friend. I have learned so much from you and look forward to our future collaborations. Thanks also to Cathy Parker and Aries Kalandides, who both provided crucial support in the earlier stages of my PhD journey.

Fellow PhD amigos James Vandeventer, Lino Trinchini, Gerrard Devney, and Giorgios Chatzinakos provided laughs, companionship, and many a late-night discussion over pizza and beers in Sandbar. Thanks also to Nikos Ntounis, Maarja Kaaristo, Aleks Vladimirov, Isabel Taube and the rest of the Space and Place Reading Group for helping ignite my passion for critical geography; and all those at the Institute of Place Management who provided constant reminders that academic enquiry should not be detached from the world of practice.

The capital as power (CasP) community also require a special mention: Troy Cochrane for explaining the basics of differential accumulation analysis; Tim Di Muzio for helping me to gain access to the data I needed to get started; and Jonathan Nitzan, Blair Fix, and James McMahon for their insightful comments on my emerging quantitative analysis.

Finally, I could not have completed this thesis without the support of my broader family. My mum and dad have provided endless support throughout alongside 'aunty' Bev. My not so little brother, Kris, less so (this is probably the first you've heard of this PhD), but I love you anyway! There are too many Marshalls and Kolodziejskis to name here, but you know who you are. The Longworth family also deserve a special mention, especially Paul and Rita, who have supported this project in so many ways over the years. Alongside Caroline, Carl, Ben, and Ethan, you have probably got used to my 'presence' at family holidays while spending half the time hunched over a laptop in the corner of the room furiously tapping away. Apologies for that! Hopefully, the conclusion of this project will enable me to be more present from now on.

For everyone I have mentioned (and those I haven't), thank you again! I could not have done this without your support.

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List of Abbreviations and Acronyms

AbC	Accumulation by Contamination
AbD	Accumulation by Dispossession
AIM	Alternative Investment Market
AJL	AJ Lucas Group
APPG	All-Party Parliamentary Group
ASX	Australian Stock Exchange
BFAWU	Baker's Food and Allied Workers' Union
BBC	British Broadcasting Corporation
BEIS	Department for Business, Energy and Industrial Strategy
BGS	British Geological Society
BP	British Petroleum
BTUs	British Thermal Units
CACCTU	Climate Change Trade Union Group
CasP	Capital as Power
CCC	Climate Change Committee
CDA	Critical Discourse Analysis
CF	Commodity Frontier
CPRE	Campaign to Protect Rural England
CWU	Communication Workers Union
DCF	Discounted Cash Flow
DCLG	Department for Communities and Local Government

DECC	Department for Energy and Climate Change
DEFRA	Department for Environment, Food and Rural Affairs
DWP	Department for Work and Pensions
ECM	Extended Case Method
EDC	Ecological Distribution Conflict
EE	Ecological Economics
EIS	Education Institute of Scotland
EJAtlas	Environmental Justice Atlas
EU	European Union
FST	Feminist Standpoint Theory
GDP	Gross Domestic Product
GIIP	Gas Initially in Place
ISEE	International Society for Ecological Economics
LCF	Localised Commodity Frontier
LNG	Liquified Natural Gas
LTV	Labour Theory of Value
ML	Local Magnitude
MP	Member of Parliament
NetPol	Network for Police Monitoring
NGO	Non-Governmental Organisation
NUT	National Union of Teachers
OPEC	Organisation of the Petroleum Exporting Countries
PA	Primitive Accumulation

PCS	Public and Commercial Services Union
PE	Political Ecology
PEDC	Political Economic Disruption Campaign
PEDL	Petroleum Exploration and Development Licence
PHE	Public Health England
PNR	Preston New Road
PR	Public Relations
SoS	Secretary of State
TLS	Traffic Light System
SMGACEs	Socio-metabolic growth and changes explanations
TSSA	Transport Salaried Staffs' Association
TUED	Trade Unions for Energy Democracy
UCU	University and College Union
US	United States
UK	United Kingdom
UKOOG	United Kingdom Onshore Oil and Gas
WACC	Weighted Average Cost of Capital

Chapter 1: Introduction

Note: This introductory chapter draws on the following blog article (Marshall, 2023), previously published on Manchester Metropolitan University's postgraduate research blog and reposted at capitalaspower.com.

1.1 Proliferating socio-ecological conflicts and crises

In recent years, intensified efforts by corporations and governments to expand the extraction and monetisation of oil, gas, and myriad other biophysical materials have precipitated a concomitant proliferation of social resistance to these efforts (Temper et al., 2015; Martinez-Alier, 2021). Typically animated by a diverse range of socio-ecological concerns regarding the negative – unevenly distributed – impacts of these extractive projects (Martinez-Alier et al., 2009), such resistance can manifest variously across spatio-temporal contexts (Scheidel et al., 2020). Proliferating within a context of widening global inequalities (Hickel et al., 2022) and climate and ecological breakdown (Gardner et al., 2021; Wiedmann et al, 2020), these 'environmental conflicts' are arguably indicative of a broader social ecological crisis grounded in the prevailing capitalist order (e.g. Di Muzio, 2015; Malm, 2016; Dow, 2019; Brand and Wissen, 2021).

Those who resist the expanding frontiers of extraction frequently pay a high price for their efforts. Indeed, according to Global Witness, 200 'land defenders' were murdered in 2021 alone (Global Witness, 2022). This accords with recent research identifying a growing trend of assassinations and death threats principally targeting indigenous environmental justice activists (e.g. Scheidel et al., 2020). Although environmental justice activists in the Global North are less at risk of suffering this fate, they are still subjected to multiple modes of corporate-state surveillance and violence (Mireanu, 2014; Brock, 2020). More positively, there is an emerging recognition that the environmental justice campaigns spawned by these conflicts are often successful in halting extractive projects (Temper et al., 2021). Moreover, since environmental justice activists frequently confront powerful actors and institutions responsible for driving socio-ecological harm(s), some have identified such activists as potential agents

of ‘radical transformations to sustainability’ (Temper et al., 2018a: 1; see also Scheidel et al., 2018). Consequently, elucidating the powerful social forces that generate and shape such conflicts emerges as an important area of academic enquiry; particularly for researchers seeking to generate knowledge that can support efforts to build a more just, equal, and sustainable socio-ecological order.

1.2 Ecological distribution conflict: searching for capitalist power and vulnerability.

The arguments outlined above are principally sourced from the ecological distribution conflict (EDC) literature; an environmental justice activist orientated literature located at the intersection of ecological economics and political ecology (e.g. Demaria, 2017; Temper et al., 2015; Martinez-Alier, 2021; Schindler and Demaria, 2016). Martinez-Alier (2021: 3) defines EDCs as ‘conflicts over the social distribution of environmental costs and benefits deriving from the material interchange between societies and nature’. Since 2012, the Environmental Justice Atlas (EJAtlas), an open-source map and database co-produced by academics and environmental justice activists, has documented the global proliferation of EDCs (see Figure 1.1). Although there are likely to be many more EDCs that remain undocumented, by January 2021 the EJAtlas had registered 3350 entries; almost three times more than the 1357 conflicts documented up to 2016. Most of these conflicts are located at the frontiers of resource extraction (e.g. mining, oil and gas extraction) and waste disposal (e.g. landfill, shipbreaking, incineration) (Martinez-Alier, 2021).[1]

[1] The EJAtlas can be accessed here: https://ejatlas.org/

Figure 1.1 The Environmental Justice Atlas (EJAtlas)
Source: EJAtlas, 2024

Consequently, this thesis primarily addresses the EDC literature. It does so, constructively with a view to improving upon extant understandings of the political economy of EDC. Specifically, while identifying numerous insights within this literature regarding the political economic drivers and dynamics of EDC, this thesis problematises extant theorisations of the role of capital and capitalist power (e.g. Demaria and D'Alisa, 2013; Demaria, 2017; Scheidel et al., 2018; Schindler and Demaria, 2020; Demaria, 2023). Similarly, while many studies in the literature explore how environmental justice activists can achieve success in EDCs, there is less specific consideration of capitalist vulnerability and how environmental justice activists might exploit such vulnerability to achieve their objectives (e.g. Temper et al., 2018b; Scheidel et al., 2018).

1.3 Capital as power and carbon capitalism

These sympathetic critiques of the EDC literature – and my proposed theoretical framework to address them – draw heavily on the capital as power (CasP) approach to political economy (e.g. Nitzan and Bichler, 2006, 2009, 2012). First developed by Jonathan Nitzan and Shimshon Bichler, CasP represents a highly novel political

economic approach which offers useful theoretical and methodological tools to help elucidate the role of capitalist power and vulnerability in the context of EDCs (Nitzan and Bichler, 2009). CasP problematises dominant understandings of capital (both neoclassical and heterodox) that conceptualise it as a material-productive entity. CasP also questions the assumption that it is analytically useful to separate 'the political' realm from the so called 'economic' and to sub-divide the latter into a nominal sphere of finance, money, and prices; and a real sphere of production and consumption. Instead, CasP theorises capital as a symbolic representation of power (measured in monetary units) and the dominant social institution that continually transforms and (re)orders capitalist society (Baines, 2015; Cochrane, 2015; Fix, 2015; McMahon, 2015).

Moreover, as a power institution that is inherently conflictual, capital should be understood in relative or differential (as opposed to absolute) terms. Thus, there is no capital in general, but rather the incessant construction and reconstruction of competing capitalist coalitions whose alliances are forever in flux. Although the sphere of production is still important within CasP, it represents just one domain of social relations amongst many, over which 'dominant capital' – the largest corporations and government agencies with which they are intertwined – must exert its power to 'beat the average', thus achieving differential accumulation (Nitzan and Bichler, 2009). This thesis draws inspiration from an activist orientated strand of CasP scholarship that explores how social justice activists can exploit capitalist vulnerability through political economic disruption campaigns (PEDCs) (e.g. Cochrane and Monaghan, 2012).

Although early CasP scholarship tended to elide capitalism's biophysical foundations, recent CasP scholarship has sought to correct this (e.g. Di Muzio, 2012, 2015; Fix, 2017, 2018; Fix et al., 2019; Bichler and Nitzan, 2020a; Cochrane, 2020). In this thesis, I draw on Tim Di Muzio's (2015: ix) energy-centric extension of CasP; focusing specifically on his theory of 'carbon capitalism and its concomitant petro-market civilization'. Drawing heavily on CasP and his own empirical analysis, Di Muzio has argued compellingly that 'the capitalist mode of power' – and the 'petro-market civilisation' with which it is intertwined – is highly dependent on the continued expansion of the oil and gas sector.

Relatedly, Di Muzio also argues that oil and gas capitalists continue to 'capitalise a future unsustainable' through the continued extraction and monetisation of oil and gas (Di Muzio, 2012: 375).

1.4 The rise of fracking conflict

Reflecting on Di Muzio's (2015) arguments, the recent proliferation of conflicts over the extraction of 'unconventional' oil and gas (colloquially referred to as 'fracking') constitutes an especially noteworthy trend (Willow and Wylie, 2014; Cotton, 2015). Until the 'fracking revolution' burst onto the scene in the United States (US) in the late 2000s, the continued reproduction of carbon capitalism and its petro-market civilisation had largely depended on the extraction, combustion, and monetisation of 'conventional' oil and gas deposits. That is, those oil and gas deposits that could be accessed relatively easily via the vertical drilling of subterranean oil and gas reservoirs located in (relatively) shallow porous rock formations such as sandstones and limestones (Lee, 2017). However, in the late 2000s, a context characterised by increasing discussions of 'peak oil' and looming energy scarcity, this situation shifted dramatically as oil and gas exploration companies in the US began to extract significant quantities of 'unconventional' oil and gas (Golden and Wisemen, 2015); that is, those oil and gas deposits located within the manifold pores and fissures of deeper, denser geological formations such as shale, coal seams, and lower permeability sandstones (Lee, 2017). In technological terms, this dramatic development was principally based on the novel combination of two techniques/technologies: high-volume slick-water hydraulic fracturing; and directional/horizontal drilling. Whereas vertical wells can only access a relatively small number of oil or gas pockets due to the limited depth of rock strata, the innovation of directional drilling enabled engineers to guide their drills horizontally in order to follow the contours of a tight (low permeability) formation for two miles or more (Howarth et al., 2011).[2] Next, comes the high-volume slick-water

[2] Over the last decade, oil and gas companies have continued to drill longer and longer 'laterals' (the horizontal part of the oil/gas well). In 2020, the longest lateral on record - drilled by Deep Well Services (a division of Sun Energy Services LLC) in Ohio's Utica Shale play - was said to be 3.8 miles in length (Beims, 2020).

hydraulic fracturing (or 'fracking'): First, a series of charges are laid at intervals along the 'lateral' (i.e. the horizontal part of the well). These charges are then detonated to fracture the rock running along the length of to the lateral, after which large volumes of 'fracking fluid' – typically a propriety combination of water, sand, and chemicals (many of which are toxic) – are pumped down the well at high pressure. While most of this fracking fluid returns to the surface of the well, much of it remains beneath the surface. Crucially (for the extractive process), the remaining fluid contains large quantities of sand, the latter serving to prop open the fractures in the rock, thus releasing the trapped oil/gas which subsequently rises up the well for collection at the surface (Lee, 2017; Howarth et al., 2011).[3]

While pro-fracking actors in, or allied with, the oil and gas business have heralded fracking as an opportunity for a new era of prosperity based upon cheap abundant energy (e.g. American Petroleum Institute, 2014) – a highly contentious and increasingly questionable claim (Bloomberg UK, 2020) – the harmful social and ecological impacts of fracking have spawned EDCs and strong social resistance almost everywhere it has been attempted (EJAtlas, 2023). Figure 1.2, the 'Fracking Frenzy Map' (produced by the EJAtlas team in collaboration with Friends of the Earth Europe), provides a sense of the global scale of both the pro-fracking offensive and the resistance these efforts have generated. In a context of climate and ecological breakdown, such resistance is hugely important; not only for halting fracking, but for contributing to the powerful climate and environmental justice movement (e.g. Temper et al., 2020) that is urgently required to defeat the actors, interests, and institutions that continue to 'capitalise a future unsustainable' (Di Muzio, 2012: 375).

[3] Technically speaking, 'fracking' – an abbreviation coined within the oil and gas industry to refer to the technique of 'hydraulic fracturing' – represents one (albeit a key) aspect of 'unconventional' oil and gas extraction. However, within popular discourse the term has taken on a broader meaning, denoting the entire process of 'unconventional' oil and gas exploration, extraction, processing, and distribution. Unless stated otherwise, whenever I refer to 'fracking' in this thesis I do so with this latter more colloquial meaning in mind.

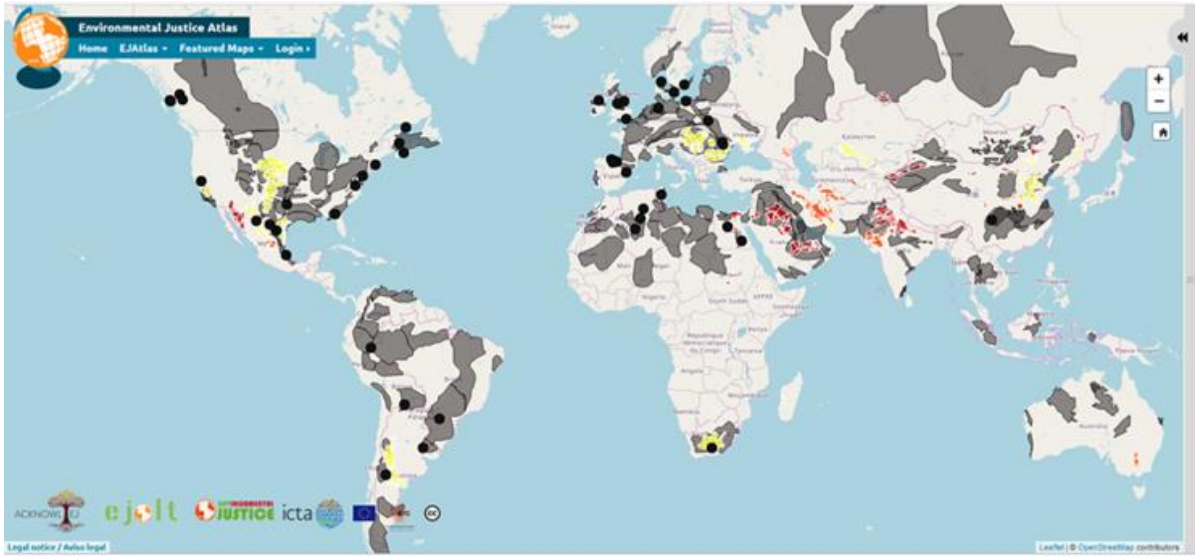

Figure 1.2 The 'Fracking Frenzy' Map
Source: EJAtlas, 2023

Thus, beyond its potential contributions to the EDC, fracking conflict, CasP, and carbon capitalism literatures, this thesis has real-world import that extends far beyond the academy. Indeed, in a rapidly warming world where the prospect of socio-ecological/climate breakdown and 'a general [albeit unevenly felt] crisis of social reproduction' looms large (Di Muzio, 2015: 153), it is imperative that we understand the powerful social forces responsible for driving these phenomena with a view to confronting/defeating them (Lucas, 2023). As noted above, the climate and environmental justice activists at the forefront of these confrontations are key protagonists in the battle for a more just, equal, and sustainable future (Scheidel et al., 2018). Consequently, exploring capitalist power and vulnerability in the context of fracking conflict – with a view to empowering anti-fracking/fossil fuel activism – would seem to be a worthwhile endeavour.

1.5 Case selection: why the UK fracking conflict?

I formally began researching the United Kingdom (UK) fracking conflict as a PhD researcher in March 2018. However, I had been following this conflict closely since the summer of 2013 when, having just returned to the UK after several years living in Spain, I learned of Cuadrilla, IGas, and several other companies' plans to bring fracking to the North West of England (where I lived). I subsequently began researching the

issue online; not formally, but as a concerned citizen keen to learn more about the implications of fracking. I subsequently attended several meetings organised by Bolton Against Fracking, a grassroots group formed by concerned Bolton residents to raise awareness about the potential threat posed by fracking to the local area and beyond. As I learned more about fracking, I became an active member of the group, helping to organise some local awareness raising events and lobby local MPs on the issue (Bolton News, 2014a; Bolton News, 2014b). I also attended a couple of anti-fracking marches in Manchester, including a solidarity rally outside of IGas' test drilling site at Barton Moss in January 2014 (Salford Star, 2014). However, keen to learn more about the systemic drivers of fracking conflict, global injustices, and social ecological crises more broadly, in September 2014 my participation in anti-fracking activism ended when I moved to Leeds to undertake an MSc in Ecological Economics at Leeds University. However, I continued to follow the conflict from afar whilst simultaneously trying to understand its broader significance using various theories and concepts from my studies. It was during this period that I first encountered the EDC literature. My MSc studies helped me to contextualise the UK fracking conflict within a broader context of globally proliferating EDCs; and a rapacious energy and material-intensive capitalist political economy. However, although I found existing explanations of fracking conflict and EDC insightful, there were many questions that remained unanswered. Was the main driver of such conflict economic growth, capital accumulation, or something else? Could the answer to this question be found in political economy, ecological economics, political ecology, or somewhere else entirely? These questions, and others, led me to apply for a PhD scholarship at Manchester Metropolitan University (MMU). Meanwhile, the UK fracking conflict was intensifying. In October 2016 (the same month I began my studies at MMU), the UK government approved Cuadrilla's application to drill for shale gas at Preston New Road (PNR) on Lancashire's Fylde Coast, overturning Lancashire County Council's previous rejection of Cuadrilla's plans (Vaughan, 2016). Given my prior connections, and geographical proximity to Lancashire and PNR, the UK fracking conflict seemed like the logical empirical context

through which to pursue my intellectual interests in fracking conflict and EDCs more broadly.

1.6 The UK fracking conflict (2011-2020): an overview

Between 2011 and 2020, the UK witnessed an intense and dynamic conflict over government-corporate efforts to open large areas of the country for 'unconventional' oil and (especially shale) gas extraction using fracking and related techniques. However, the seeds of this conflict were sown in 2008 when the UK (then Labour) government granted dozens of small oil and gas exploration companies Petroleum Exploration and Development Licences (PEDLs) to explore for onshore oil and gas in large parts of the country (see Figure 1.3 below) (Department for Energy and Climate Change [DECC], 2008).[4] For example, Cuadrilla, a privately-owned UK-registered company, obtained PEDLs covering Lancashire's Fylde Coast in the North West of England and West Sussex in the South East (Hayhurst, 2016a). According to one of Cuadrilla's largest shareholders, AJ Lucas, a mining and infrastructures services firm listed on the Australian stock exchange (ASX), Cuadrilla was founded in 2007 'to unlock untapped unconventional resource plays in selected parts of Europe' (AJ Lucas, 2010: 1).[5]

In AJ Lucas' 2009 annual report, the Australian firm justified their Cuadrilla investment in the following terms:

> Shale gas as an industry in the USA has gone from zero to billions of dollars of revenue per annum on the back of these technologies – within a five year period. Cuadrilla/Lucas believe that the same phenomenon can occur in Europe and that Europe lags the USA by some years in these areas. This is the raison d'être of our involvement with Cuadrilla (ibid.).

[4] The pink blocks refer to PEDLs offered in the 13th onshore round, while yellow ones denote PEDLs leased in previous rounds (DECC, 2008).

[5] Although AJ Lucas is a relatively small corporation, some of its largest shareholders have included large corporate behemoths (i.e. dominant capital) such as JP Morgan, Citicorp, and HSBC (AJ Lucas, 2015).

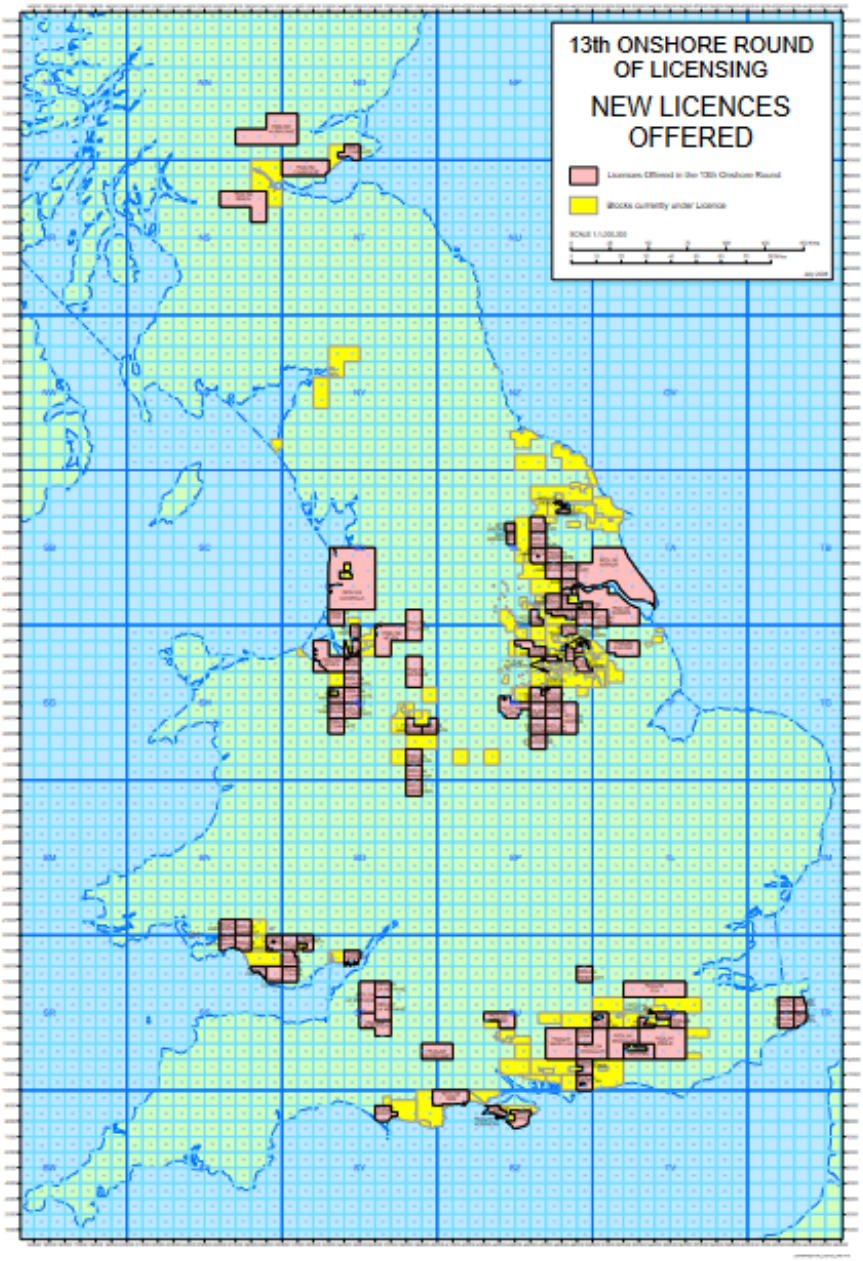

Figure 1.3 13th Licensing Round. Map of PEDLs Offered
Source: DECC, 2008

Prior to the Spring of 2011, very few UK residents were aware of fracking, or that Cuadrilla and others had already initiated their UK exploration activities. However, this changed in the spring of 2011, when Cuadrilla's first fracking attempts at Preese Hall, near Blackpool on Lancashire's Fylde Coast, precipitated 58 earth tremors. Two of these tremors (with magnitudes of 2.3 and 1.5 on the Richter Scale), were felt above ground causing distress and sparking broader public debate about fracking (Szolucha,

2016). In Lancashire especially, but also elsewhere, these tremors catalysed a flurry of public meetings by concerned residents, which led to the formation of multiple place-based anti-fracking groups (e.g. Residents Action on Fylde Fracking, the Lancashire Nanas, Ribble Estuary Against Fylde Fracking). This process was aided by Frack Off, a nationally focused anti-fracking organisation formed in 2011 that describes itself as 'an extreme energy action network'. Particularly in the early years of the fracking conflict, Frack Off was instrumental in raising awareness about fracking; both through direct action and outreach in local communities. Its website (https://frack-off.org.uk/) also served as an invaluable hub of information about unconventional oil and gas extraction and the key players involved. It also provided support, advice, and materials for communities seeking to form their own anti-fracking groups and served as a platform for anti-fracking groups to publicise their meetings and events (Frack Off, 2019a).

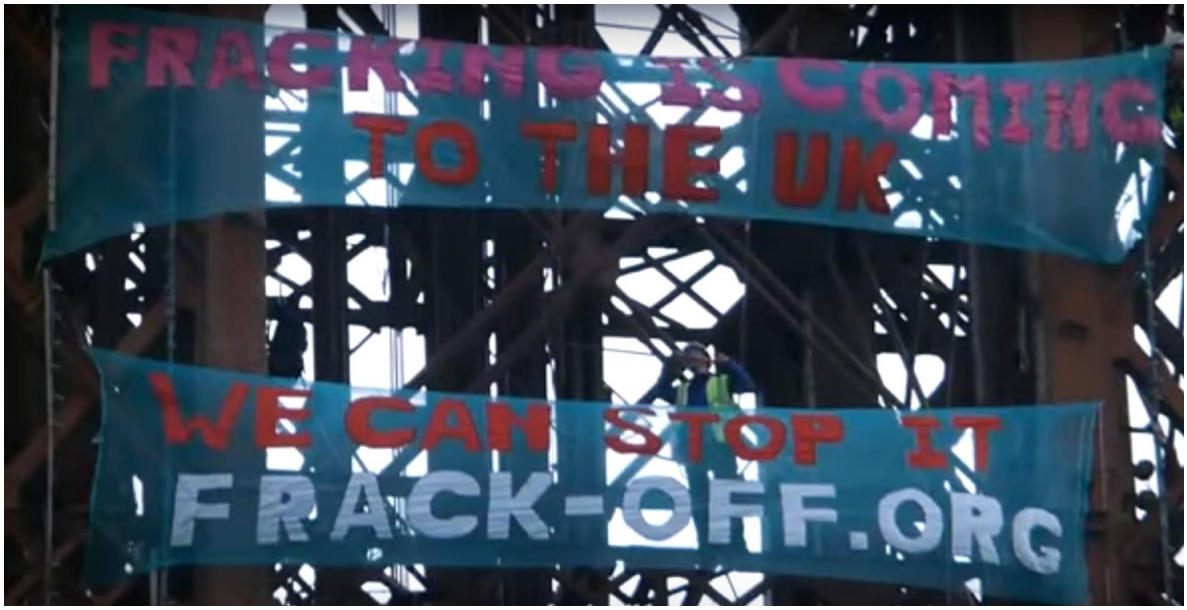

Figure 1.4 Frack Off Banner Drop from Blackpool Tower, 6 August 2011
Source: Frackoffuk, 2011

On 6 August 2011, three months after the earthquakes at Preese Hall mentioned above, two Frack Off activists scaled Blackpool Tower, unfurling two large banners. The first one said: "FRACKING IS COMING TO THE UK"; while the second one read: "WE CAN STOP IT" …"FRACK-OFF.ORG" (see Figure 1.4, above). While this audacious action resulted in one of the activists being convicted of aggravated trespass (van der Zee,

2012), it received national media coverage (e.g. BBC, 2011) and has been credited with marking the 'birth' of the UK anti-fracking movement (Lorenzen, 2013).

Following a short-lived moratorium in the wake of Cuadrilla's fracking-induced tremors at Prese Hall, the UK (Conservative/Liberal Democrat coalition) government stepped up its support for fracking with the Prime Minister, David Cameron, famously declaring that his government were 'going all out for shale' (Watt, 2014: Online). This support included: generous tax-breaks (Bawden, 2013a); re-writing planning guidance to make it harder for local councils to reject applications (DECC and the Department for Communities and Local Government [DCLG], 2015; Brock, 2020); changing property law to enable oil and gas firms to frack under people's land without the landowner's permission (Hayhurst, 2015); and the opening up of even more areas of the country for fracking (see Figure 1.5, below).

This step change in government support and fracking 'hype' coincided with the entry of several larger corporate players (e.g. Ineos, Centrica, GDF Suez, Total) into the pro-fracking coalition (e.g. Harvey, 2013; BBC News, 2014a). However, as the conflict progressed, fracking companies and investors became increasingly frustrated as they struggled to progress their drilling plans. Local planning authorities consistently failed to process fracking planning applications within the exacting timeframes mandated by government (e.g. Pöyry, 2014; Brock, 2020). Moreover, responding to the concerns and lobbying of residents and anti-fracking groups, local councils were becoming increasingly likely to reject such applications (e.g. Vaughan, 2015; Hayhurst, 2018a). However, when planning approvals were obtained, whether from local authorities (Sims, 2016) or following government intervention (Vaughan, 2016a), progress was further delayed by anti-fracking activists who sought, with significant success, to disrupt fracking through peaceful protest and non-violent direct action (Hayhurst, 2017a, 2017b).

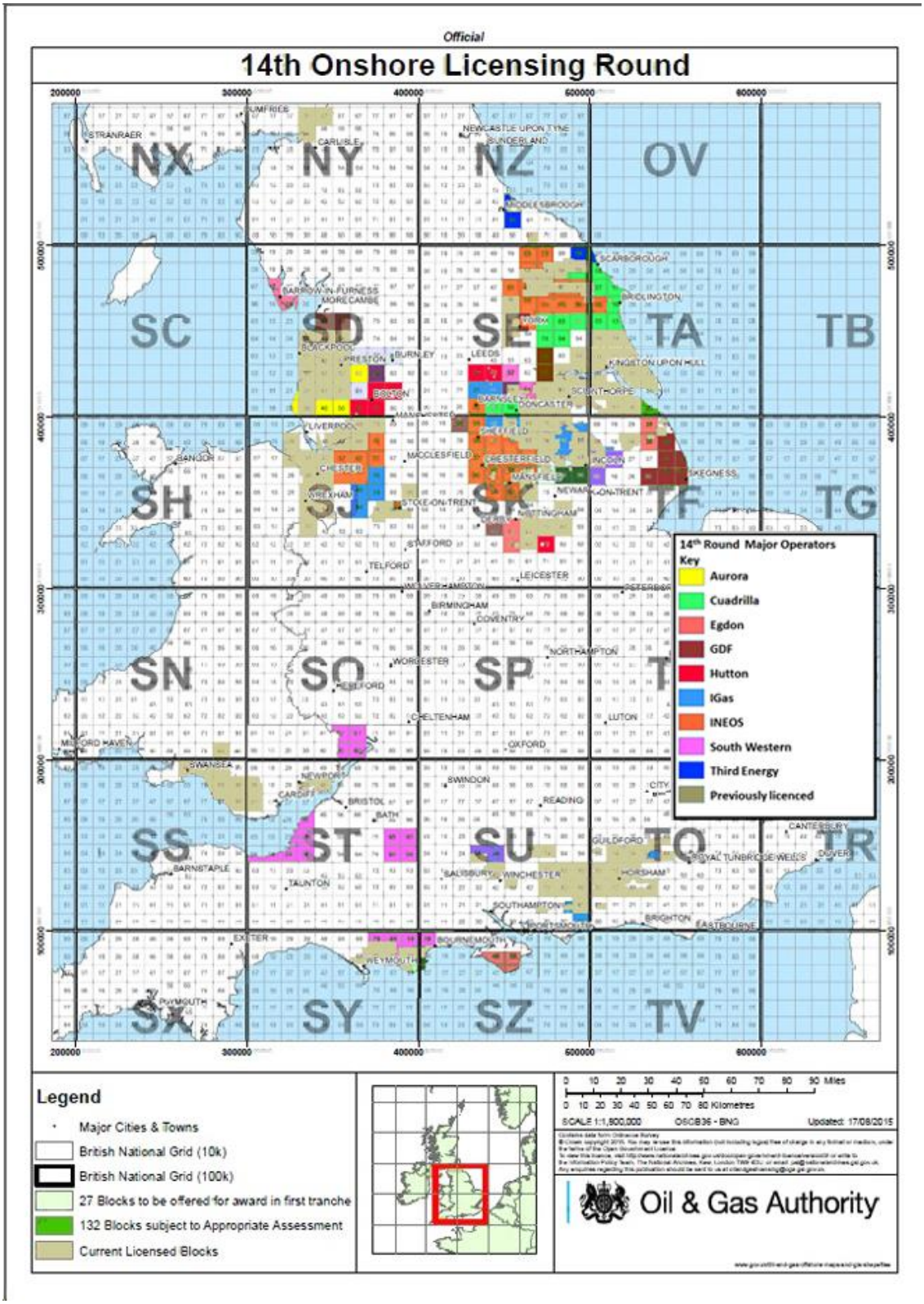

Figure 1.5 14th Onshore Licensing Round. Map of PEDLs offered
Source: Drill or Drop, 2015: online

In October 2018, when Cuadrilla began hydraulic fracturing its first shale gas well at its Preston New Road (PNR) site on Lancashire's Fylde Coast, this was the first (shale gas) fracking in the UK since the Preese Hall earthquakes seven years previously. However, Cuadrilla were forced to abandon this latest round of fracking in December 2018 after precipitating multiple tremors (Hayhurst, 2018b, 2018c). Cuadrilla and its allies spent the next several months furiously lobbying the UK government to relax the Traffic Light System (TLS) regulations regarding fracking-induced seismicity, introduced after the events at Preese Hall. Under the TLS, if observed seismicity during pumping (i.e. when fracking fluid is being pumped down the well at high pressure into the shale rock) reaches 0.5 or higher on the Richter or local magnitude (ML) scale, the company involved is obliged to stop fracking for 18 hours and check that the well casing had not been compromised (Hayhurst, 2018d). When these new regulations were announced, the fracking companies accepted them and welcomed the government's decision to lift the moratorium (Hickman, 2012). However, with the TLS constraining their ability to frack at PNR, Cuadrilla argued that, unless the TLS seismicity limit was revised upward, these regulations risked 'strangling' the UK's nascent shale gas sector (Sheppard and McCormick, 2018: Online). However, with opposition to fracking at an all-time high (BEIS, 2019), and growing discontent within the ruling Conservative party on the issue (Pidd and Taylor, 2019), for the first time in a decade the (arguably) most powerful actor in the pro-fracking coalition, the UK government, appeared to be wavering in its support for fracking. This was confirmed in April 2019 when the UK government's 'fracking Czar', Natacha Engel, resigned from her role in protest arguing that 'a perfectly viable industry is being wasted because of a Government policy driven by environmental lobbying rather than science, evidence and a desire to see UK industry flourish' (Rose, 2019: Online). The UK government no longer appeared to be 'going all out for shale' (Watt, 2014: Online).

With no sign of the UK government relenting to the fracking companies' lobbying drive on the TLS, on 15 August 2019, Cuadrilla, throwing caution to the wind, began fracking its second horizontal well at PNR. However, Cuadrilla were again forced to suspend its fracking activities on 26 August 2019 after precipitating hundreds of seismic events

and an earthquake measuring 2.9ML, the UK's largest fracking-linked tremor to date (Hayhurst, 2019b). This generated significant media coverage, protest, and even more controversy. Then on 2 November 2019, in a dramatic policy reversal, the UK government announced an end to its decade-long support for (shale gas) fracking in England. Substantively, this policy shift would be operationalised through the imposition of 'a moratorium on fracking until compelling new evidence is provided' and a parallel decision not to proceed with its 'proposed planning reforms for shale gas developments at this time' (UK Government, 2019: Online).[6]

This latest moratorium on shale gas fracking arguably represents a significant, albeit partial, victory for the UK anti-fracking coalition. It is a partial victory because the moratorium only covers processes that conform to the 2015 Infrastructure Act's narrow, and highly contested, definition of fracking. Importantly, this narrow definition of fracking does not cover exploratory drilling and controversial processes such as acid stimulation (Hayhurst, 2020a, 2020b; Zalucka et al., 2021). Consequently, it has been argued that the moratorium leaves the door open for '[f]racking by stealth', especially in those parts of the country (e.g. Surrey, West Sussex, Lincolnshire) where 'tight oil' and/or 'tight gas' (rather than shale gas) are the principal 'unconventional' resources being targeted for extraction (Zalucka et al., 2021: 1). Indeed, in these parts of the country, the fracking threat has not subsided, and communities are still struggling to halt the expansion of the 'unconventional' oil and gas frontier (e.g. Hayhurst, 2023a). Nevertheless, for as long as this latest moratorium is maintained, there would appear to be little prospect of any further attempts to frack for shale gas in England (Bradshaw et al., 2022; Ambrose, 2022; Ratcliffe, 2022).[7] This is underscored by the subsequent decision(s) of key investors in UK fracking to abandon their investment. For example, in February 2020 Riverstone, the US private equity firm

[6] I explore these proposed reforms in subsequent sections.

[7] Although enacted by the UK government, this moratorium only applies to England. The Scottish government, which has devolved powers pertaining to fracking, instituted its own moratorium in 2015 (BBC, 2015). Similarly, since December 2018, there has been an effective ban on fracking in Wales, which also has devolved powers in this area (Friends of the Earth Cymru, 2018).

that had promised to invest 'whatever it takes' to make UK fracking a success (Harvey, 2013: Online), returned its 45% stake in Cuadrilla to AJ Lucas (another Cuadrilla investor) for a nominal sum. Five months later, with no sign of the government shifting its position on the moratorium, Centrica, the first relatively dominant publicly listed energy firm to invest in UK shale gas via Cuadrilla, also exited its investment (Monaghan, 2013), returning its 25% stake in the Bowland license to AJ Lucas for a nominal sum (Hayhurst, 2020c). Meanwhile, in October 2020 it was revealed that Ineos' UK shale gas division had written down its UK shale gas assets by more than £63 million following the moratorium, giving them an effective value of £0. This followed three years of financial losses totaling more than £255 million (Hayhurst, 2020d). Thus, while these (and other) investors collectively sunk hundreds of millions of dollars into their decade-long struggle to accumulate differentially through UK fracking without ever seeing a return, the anti-fracking slogan depicted in Figure 1.6 appears to have been rather prescient.

Figure 1.6 The goal of anti-fracking tactics
Source: Author's photograph, 2018

1.7 The opposing sides

Before I explore the power struggles that comprised the UK fracking conflict, it is necessary to introduce the 'opposing sides' in this conflict. Although I have described the ongoing moratorium on shale gas fracking as a victory for the anti-fracking coalition, I have yet to explore the key actors and groups that comprised this coalition or its pro-fracking counterpart.

1.7.1 Dynamic coalitions

However, it is important to preface this discussion by highlighting the coalitional dynamism that characterised this decade-long conflict. Indeed, like any other (EDC) conflict, the alliances and formations that constituted the pro and anti-fracking coalitions were not static, but rather changed through time as the conflict unfolded through space and time. In making this argument, I draw upon Nitzan and Bichler's (2009: 315) insight that 'in the capitalist creorder' the capitalist mode of power 'must be dynamically recreated through ever-shifting alliances'; a point which arguably applies equally to those actors/groups that might attempt to challenge the power of any particular capitalist coalition.

The UK government's decision to end its decade-long support for (shale gas) fracking in England — thus breaking ranks with the pro-fracking coalition — is probably the most notable example of the coalitional dynamism outlined above (UK Government, 2019). This is also exemplified by the shifting official stances on fracking of key organisations such as the Campaign to Protect Rural England (CPRE), the Liberal Democrats, and the Labour Party. CPRE is a countryside protection charity, which has been described as '"small-c" conservative' (Shepherd, 2021: 529) and 'One-Nation preservationist' in outlook (Tait and Inch, 2016: 182). In 2013, CPRE's official stance was to be cautiously 'realistic and open to debate' about fracking (Pickard, 2013: Online). However, by mid-2017 this stance had shifted to calling for a moratorium on fracking unless the government could prove the process would 'secure the radical reductions in carbon emissions required to comply with planning policy and meet legally binding climate change targets (Hayhurst, 2017c: Online). By the Spring of 2018, CPRE were

'working…with other anti-frackers, including Friends of the Earth, 38 Degrees, 350.org, SumOfUs and Frack Free United' to fight the government's plans to 'fast-track fracking' (CPRE, 2021: Online). Even more dramatically, the Liberal Democrats, having been junior partner in the pro-fracking Conservative-led coalition government (2010-2015) that made shale gas development a national priority, came out against fracking in 2017, citing concerns about climate change (Liberal Democrats, 2017). The Labour Party's official position on fracking also shifted dramatically from cautious support in 2015 (Labour Party, 2015) to vociferous opposition in 2016 following the election of Jeremy Corbyn as leader (Vaughan, 2016b). Taken together, the examples outlined above illustrate how, as the UK fracking conflict progressed, the anti-fracking coalition successfully expanded (its alliances), often at the expense of its pro-fracking counterpart.

Having highlighted the dynamism of the UK fracking conflict's coalitional politics, I will now provide a more schematic overview of these two competing coalitions, focusing on some of the key actors, organisations, and institutions that comprised and shaped them.

1.7.2 The pro-fracking coalition

The core of the pro-fracking coalition comprised the corporations and investors that endeavoured to accumulate differentially through fracking during this period. Most of the oil and gas exploration firms that spearheaded the UK fracking drive (e.g. Cuadrilla, IGas, Third Energy, Egdon Resources etc.) were relative minnows in corporate terms (Hellier, 2015). However, a notable exception to this was Ineos, a privately-owned oil, gas and petrochemicals conglomerate whose dominant owner, Jim Ratcliffe, is one of the wealthiest individuals in the UK (Bryant, 2018; The Sunday Times, 2020). Since its £5.1bn purchase of BP's petrochemicals business back in 2005, Ineos has consistently been the largest private company in the UK and one of the biggest petrochemicals firms on the planet (Ineos, 2015). However, within the last few years, it has also been investing heavily in oil and gas assets to secure cheaper inputs for its petrochemical manufacturing business (Vanaerschot, 2020; Client Earth, 2021). Ineos was a relatively

late entrant into UK fracking, purchasing its first PEDL licenses in August 2014. However, having announced its intentions to become a major player in the UK shale gas, by the end of 2017, Ineos had purchased more PEDL licenses than any other firm, granting it exploration rights to more than 1.2 million acres of land; mostly in Scotland, Yorkshire, and the Midlands (Powerbase, 2019a).

UK Onshore Oil and Gas (UKOOG), the industry body representing the interests of the onshore oil and gas companies and their suppliers, was another key actor in the pro-fracking coalition (UKOOG, 2022a). UKOOG played a key role in the UK fracking conflict disseminating pro-fracking discourses and lobbying the UK government on behalf of its members (i.e. Cuadrilla, IGas, Ineos etc.) (e.g. UKOOG, 2015a).

The corporate investors of UK fracking formed another important grouping within the pro-fracking coalition. Here it is possible to identify several large corporations that would fall within the category of dominant capital (Nitzan and Bichler, 2009) for example: Barclays, the UK-based banking giant, who was a key investor in Third Energy (Kleinman, 2018); Centrica, the UK's largest utilities firm, which held a 25% stake in Cuadrilla's 'Bowland' shale gas license in Lancashire between 2013 and 2020 (Hayhurst, 2020g); Total, the French oil and gas conglomerate, which purchased stakes in licenses operated by IGas and Egdon Resources (Reuters, 2017). Within this group, private equity firms were amongst some of the most important investors in UK fracking.[8] For example, while private equity firms Riverstone Holdings and Kerogen Capital were — alongside Australian energy, mining, and infrastructure firm AJ Lucas — key investors in Cuadrilla (AJ Lucas, 2011), Kerogen also invested heavily in IGas (Hopkins, 2017).

Beyond those directly invested in UK fracking, other dominant oil and gas corporations such as Shell and BP voiced their support for efforts to establish the commercial viability of UK shale gas (e.g. Bawden, 2013b; Macalister, 2014) while also participating

[8] Private equity firms are privately owned corporations that raise and manage investment funds of limited duration, usually around a decade. The funds are used to purchase existing companies, which are typically held for three to five years; after which the fund will seek to achieve a successful (i.e. profitable) exit from their investment (Erturk et al., 2010).

in government and parliamentary discussions on the issue (e.g. Vaughan, 2018a). During the early years of the conflict especially, many pro- and anti-fracking actors suspected that, should the UK fracking drive prove successful, larger players such as Shell and BP would seek to buy into the sector as they had previously done in the US (Interviews; Goodey, 2013; Hellier, 2015). This argument aligns with Nitzan and Bichler's (2009) insight that, rather than greenfield investment (i.e. external breadth), dominant capital's favoured regime of differential accumulation is via mergers and acquisitions (i.e. internal breadth).

Conservative-leaning newspapers such as The Telegraph, The Sun, the Daily Mail, and The Times were also highly supportive of the fracking agenda and played a key role disseminating pro-fracking discourses. Consequently, these newspapers can also be regarded as important players in the pro-fracking coalition (e.g. Stevenson, 2013; Lean, 2013; Rose, 2019; Pollard, 2018).

Perhaps the most crucial constituents of the pro-fracking coalition were the UK government and the PR and lobbying firms that ensured their oil and gas business clients' interests were represented in government. The revolving door between government, the oil and gas sector, and its PR/lobbying firms is well documented (e.g. Dinan and Miller, 2007; Cave and Rowell, 2015). For example, prior to working as an energy advisor for David Cameron, Tara Sing was employed by Centrica as its chief lobbyist. Between 2013 and 2020, Centrica held a 25% stake in Cuadrilla's 'Bowland' shale gas license in Lancashire (Hayhurst, 2020g). Cameron's previous energy advisor, Ben Moxham, left this role to join Riverstone Holdings, the US private equity firm that, at the time, owned a 45% stake in Cuadrilla. Prior to advising David Cameron, Singh also worked for Hill and Knowlton Strategies, a PR and lobbying firm with a long track-record of lobbying on behalf of the oil and gas industry (Jones and Rowell, 2015). However, as indicated by the example of Lord John Browne, frequently, even the revolving door metaphor does not capture the extent to which oil and gas interests are embedded in the UK government. In June 2010, Riverstone partner and recently installed chairman of Cuadrilla, Lord Browne, was appointed by the UK government as a non-executive director within the Cabinet Office. Not only did this role give Browne

privileged access to key government departments pertaining to UK energy and fracking policy (e.g. the Treasury and the Department for Energy and Climate Change), but it also afforded him significant influence over senior appointments within those departments (Leftly, 2013; Johnstone et al., 2017). During Browne's five years in the Cabinet Office (2010-2015), a period when the UK government's support for fracking was especially muscular, he did not relinquish his roles at Riverstone and Cuadrilla (Mandel, 2015). Moreover, freedom of information requests reveal that Browne used his position in the Cabinet Office to lobby ministers on Cuadrilla's behalf on four separate occasions. However, the government declined to provide details of the topics covered during these meetings so as not to 'prejudic[e] the commercial interests of Cuadrilla' (Frack Off, 2013a: Online).

Beyond UK government organs and institutions, the UK pro-fracking coalition comprised multiple corporate entities (large and small) with financial interests in the oil and gas business. While some of these corporations are UK-registered, many are not and even those that are, typically involve significant amounts of international ownership. Therefore, rather than a comment on the provenance of its diverse constituents, the *UK part of the UK pro-fracking* coalition refers to both the integral role of the UK government in this coalition and the territorial locus of its organising fracking efforts.

Another notable member of the UK pro-fracking coalition was the GMB Union; the only UK trade union to adopt an official position of support for UK fracking. In 2015, GMB, which represents thousands of oil and gas workers, signed an agreement with UKOOG to collaborate on the promotion of UK fracking and gas more generally (UKOOG, 2015b).

In Lancashire, where I conducted most of my fieldwork, the most prominent 'local' pro-fracking group was Lancashire for Shale; a 'local' lobbying organisation with close links to Cuadrilla, Centrica, and the local chamber of commerce. While Lancashire for Shale comprised a relatively small group of individuals, its most prominent members tended to be local, white, male, business owners who regarded shale gas as an

economic and business opportunity (Refracktion, 2016). Much like other forms of corporate campaigning (Walker and Rea, 2014), Lancashire for Shale and Cuadrilla's local activism tended to revolve around business engagement, lobbying, PR (both online and offline), and sponsorship activities. Despite their claims to the contrary, Lancashire for Shale were widely regarded by anti-fracking activists as an 'astroturfing' operation sponsored by the oil and gas business (Szolucha, 2016).[9] While this claim has not been confirmed formally, Lancashire for Shale has acknowledged Cuadrilla and Centrica's financial sponsorship. Moreover, it also had links with Westbourne Communications; a controversial lobbying/PR company – also hired by Cuadrilla (Refracktion, 2016) – with an established track-record of organising campaigns to intimidate and disrupt grassroots activism on its corporate clients' behalf (Cave and Rowell, 2015). Backing Fracking were another prominent pro-fracking group, which anti-fracking activists regarded as an oil industry backed astroturfing operation. Mostly operating anonymously via social media, this group's core activities largely seemed to focus on attacking and delegitimising anti-fracking activists. However, Backing Fracking's funding sources and membership are unknown. Consequently, pro-fracking activism during this period was characterised by its limited accessibility and opaqueness, typically operating through private engagements where access was restricted via fee or invitation (Lloveras et al., 2021).[10]

1.7.3 The anti-fracking coalition

At the core of the anti-fracking coalition were the hundreds of local grassroots 'frack-free' groups that proliferated during this period; especially in the areas located within the PEDL areas most threatened by fracking- e.g. Lancashire, Greater Manchester, Yorkshire, Derbyshire, Nottinghamshire, Sussex etc. (Frack Off, 2019b). These local groups were supported by a myriad of individuals and groups from all over the UK. This

[9] Astroturfing denotes business-sponsored 'grassroots' political activism involving participation that is heavily incentivised, the fraudulent misrepresentation of citizen's viewpoints, and/or failure to disclose corporate sponsorship (Walker and Rea, 2014: 293).

[10] This paragraph draws heavily on arguments previously developed in the following co-authored paper (Lloveras et al., 2021).

included countless individuals who regularly travelled to support and show solidarity with the local frack free groups. Some of these activists even relocated to the areas threatened by fracking. This latter group, which tended to reside on anti-fracking camps nearby (potential) fracking sites, played an especially important role mobilising opposition and disrupting the fracking business. The anti-fracking camps were largely sustained through the solidarity and mutual aid of local activists (Lloveras et al., 2021; O'Brien, 2023).

The anti-fracking coalition also included nationally focused anti-fracking groups such as: Frack Off, which provided detailed research on the fracking business, its vulnerabilities, and the potential to exploit these vulnerabilities through community outreach, the planning system, and community blockades (Frack Off, 2019a); and Frack Free United, a loosely organised federation of local anti-fracking groups that tended to focus more on lobbying and communications activities (Frack Free United, 2022). National anti-fossil fuel/climate justice activist networks such Reclaim the Power (Reclaim the Power, 2019) and, to a lesser extent, Extinction Rebellion also played important roles in the anti-fracking coalition, supporting local anti-fracking groups via fracking site blockades and various forms of non-violent direct action (Halliday, 2019a).

Environmental non-governmental organisations (NGOs) were also important constituents of the anti-fracking coalition. For example: Friends of the Earth provided legal expertise to anti-fracking groups, especially regarding the planning system (Interviews); Greenpeace undertook important research into the fracking sector (e.g. Boren, 2015) while also raising public awareness of fracking through eye-catching stunts (e.g. Greenpeace, 2014); and 350.org, alongside Friends of the Earth, Frack Free United, Fossil Free UK, and others helped organise an effective lobbying campaign against government plans to fast-track fracking by bypassing local planning authorities (e.g. Fossil Free UK, 2019).

Following extensive grassroots organising within the membership, most UK trade unions (apart from GMB) adopted official positions of opposition to fracking (Price,

2019).[11] However, as noted in a 2017 report by the Campaign against Climate Change Trade Union Group (CACCTU) the UK fracking conflict created 'divisions between and within different trade unions' (CACCTU, 2017: 12). Thus, while Unison, Unite, NUT (National Union of Teachers), PCS (Public and Commercial Services Union), EIS (Education Institute of Scotland), TSSA (Transport Salaried Staffs' Association), UCU (University and College Union), CWU (Communication Workers Union), and BFAWU (Baker's Food and Allied Workers' Union) all passed conference motions 'against fracking and in-support of the anti-fracking campaign in the UK', some of these motions contradicted the stance of union leaders (ibid.). Anti-fracking trade unionists have also been credited with helping shift the Labour Party into a more overtly anti-fracking fracking position; especially after Jeremy Corbyn became leader in September 2015 (Price, 2019).

Of all the mainstream political parties in the UK, the Green Party was the only one to consistently oppose fracking during this period, and its leadership and activists played key roles in the anti-fracking coalition, both through grassroots activism and formal political processes. This dual approach is exemplified by the Green Party's only MP, Caroline Lucas, who consistently raised the fracking issue in parliament, but was also arrested in 2013 for blocking Cuadrilla's site at Balcombe in Sussex (Harvey and Walker, 2013). This approach was replicated by Green Party councillors and activists throughout the country (e.g. Hayhurst, 2017h; Rothery, 2019).

Several prominent corporations such as Ecotricity, Lush, and Patagonia also participated in the UK anti-fracking coalition in various ways (Saul, 2013; Ecotricity, 2018; MyOutdoors, 2018).

In Lancashire, where I undertook much of my fieldwork, opinion polls indicate that most Lancashire residents object to fracking (Hayhurst, 2017d). However, grassroots anti-fracking activism in the county tended to involve a relatively small number of individuals, organising through local 'frack-free' groups (e.g. Frack Free Fylde, the

Roseacre Awareness Group, the Preston New Road Action Group, The Moss Alliance etc.). Most of these local groups were loosely organised within Lancashire under the banner of Frack Free Lancashire (http://frackfreelancashire.org/), and nationally that of Frack Free United (https://www.frackfreeunited.co.uk/) and Frack Off (https://frack-off.org.uk/). While chiefly driven by the activities of a dedicated, relatively enduring, activist core (approximately 50–80 people), Lancashire's anti-fracking activism was significantly bolstered by the support and solidarity of a broader network of individuals and groups located both within and beyond the county. In sum, Lancashire's anti-fracking activism during this period could be characterised as complex, fluid, and intermittent, comprising myriad forms of engagement (offline and online), multiple ideological orientations, backgrounds, motivations, and degrees of commitment. Consequently, although certain demographics tended to predominate (e.g. white British, middle-class, retirees, female), mobilising general categories to elucidate the real-life complexities of Lancashire's anti-fracking activism can be counterproductive (Lloveras et al., 2021).[12]

1.8 Aim, research questions, and thesis outline

In the contexts of EDC (broadly) and fracking conflict (specifically), this study aims to explore, understand, and explain the roles/dynamics of capitalist power and vulnerability. In doing so, it seeks to generate knowledge that can support efforts to build a more just, equitable, and sustainable political economic order. Pursuant to the above, this research will address the following three research questions:

1. In what ways does capitalist power both drive and shape EDCs/fracking conflict and why is this so?
2. In what ways are capitalists vulnerable within the context of EDCs/fracking conflict and why is this so?
3. What are the implications of capitalist power and vulnerability for:
   (i) environmental justice activism?

[12] This paragraph draws heavily on ideas I previously developed in the following co-authored paper (Lloveras et al., 2021).

(ii) ongoing efforts to build a more just, sustainable, and equitable political economic order?

This PhD thesis will proceed as follows. Chapter 2 comprises a critical literature review of the EDC literature, an environmental justice activist orientated literature at the intersection of ecological economics and political ecology. In this chapter, I argue that the EDC literature offers numerous insights regarding the political economic drivers and dynamics of EDC. However, I also identify important weaknesses in this literature, especially regarding extant theorisations of the capital-power-vulnerability dialectic in EDCs. Finally, this chapter briefly reviews the fracking conflict literature, identifying similar weaknesses as its EDC counterpart regarding its ability to elucidate capitalist power and vulnerability in such conflicts.

Chapter 3 introduces Nitzan and Bichler's (2009) CasP approach and Di Muzio's (2015) theory of carbon capitalism. In doing so, it argues that these cognate approaches offer numerous theoretical-analytical insights for EDC and fracking conflict scholars to help address some of the weaknesses identified in Chapter 2. Drawing on Cochrane and Monaghan's (2012) activist-oriented reading of CasP, I further argue that environmental justice activists may also benefit from engagement with these overlapping approaches. I conclude this chapter by synthesising a CasP-carbon capitalism driven theoretical framework for elucidating capitalist power and vulnerability in the context of EDCs and fracking conflict. Importantly, however, while CasP and carbon capitalism underpin this framework, the latter also incorporates key insights from EDC literature.

Chapter 4 articulates the ontological, epistemological, and politico-ethical assumptions underpinning this thesis. Beginning by elaborating a processual understanding of social ecological reality, I then articulate how this assumption aligns with my CasP and carbon capitalism driven theoretical framework. Having unpacked CasP and carbon capitalism's existing epistemological-methodological toolkit (Nitzan and Bichler, 2009), I subsequently argue that this toolkit could usefully be augmented to aid investigations into capitalist power and vulnerability in the context of EDC and fracking conflict. For

this thesis, I propose to augment the toolbox with a synthesis of feminist standpoint theory (e.g. Harding, 2015) and Burawoy's extended case method and reflexive science (2009). I then justify my decision to explore the UK fracking conflict before elaborating (and justifying) my quantitative-qualitative data collection and analysis strategy.

Chapter 5 elaborates my theoretical-empirical investigation of the UK fracking conflict (2011-2020). Drawing on my CasP and carbon capitalism driven theoretical framework, this investigation seeks to address the research aim and questions outlined above. Having provided an overview of this decade-long conflict and declared (partial) victory for the UK anti-fracking coalition against their pro-fracking adversaries (Section 5.1), I subsequently outline the two opposing coalitions (Section 5.2). Section 5.3 presents some key quantities, arguing that these partially express the UK fracking conflict's myriad (qualitative) power struggles. Subsequent sections centre these struggles, elucidating them through the lenses of Nitzan and Bichler's (2009) elementary particles of differential capitalisation, focusing especially on differential risk and differential hype.

Considering the UK fracking conflict's broader significance, Section 5.5 analyses the UK fracking conflict through the Di Muzio's (2015) concepts of carbon capitalism and petro-market civilisation. I begin this section by exploring how anti-fracking activists' struggles enabled them to gain a deeper understanding of capitalist power, carbon capitalism, and the central role of oil and gas in contemporary patterns of social reproduction. Subsequently, I examine how the UK fracking conflict illuminates the intra-capitalist conflict, reflecting on the implications for environmental justice activism. Finally, I critically explore the implications of the competing energy future visions that emerged during the UK fracking conflict.

Chapter 6 concludes with a critical discussion of my findings in relation to my research aim and questions. I then articulate the thesis' main theoretical and methodological contributions to the EDC, fracking conflict, CasP, and carbon capitalism literatures before suggesting potentially fruitful avenues for future investigation.

Chapter 2: The global proliferation of ecological distribution (and fracking) conflicts: existing explanations

Note: This chapter draws upon the following blog article (Marshall, 2023), previously published on Manchester Metropolitan University's postgraduate research blog and reposted on capitalaspower.com.

2.1 Introduction

In this chapter, I critically review the various strands of academic literature that inform this thesis. Firstly, I situate my study at the intersection of ecological economics (Section 2.2) and political ecology (Section 2.3); two overlapping fields whose most fruitful engagements can be found in the ecological distribution conflict literature (Section 2.4). Here, I explore two broad explanations for the global proliferation of ecological distribution conflict: *Socio-metabolic growth and changes explanations;* and *Marxist explanations.* While arguing that each of these explanations provide valuable insights, I also identify important blind spots and questionable assumptions that limit their value to elucidate the political economic drivers and dynamics of such conflicts, especially regarding the role of capitalist power and vulnerability. Section 2.5 briefly reviews the fracking conflict literature, identifying several assumptions, blind spots, and weaknesses shared with its EDC counterpart. Section 2.6 concludes the chapter with a summary of its main arguments.

2.2 Ecological economics

A trans/interdisciplinary field straddling the natural and social sciences, *ecological economics* (hereafter EE) emerged, largely, as a corrective to the perceived failures of mainstream (neoclassical) economics to: (a) apprehend the biophysical foundations of all 'economic' activity; and (b) consider other human values (e.g., wellbeing, health, community, human rights etc.) beyond utilitarian notions of economic value (e.g. Daily,

2013; Martinez-Alier and Muradian, 2015).[13] In this regard, Constanza et al (1991: 3) stated that EE constituted itself as:

> a new transdisciplinary field of study that addresses the relationships between ecosystems and economic systems in the broadest sense. These relationships are central to many of humanity's current problems and to building a sustainable future but are not well covered by any existing scientific discipline.

Most ecological economists have been critical of the societal obsession with Gross Domestic Product (GDP), a national indicator expressing the total monetary value of all goods and services generated within a country each year (e.g. Daly, 2013). Therefore, while neoclassical economists tend to assume rising GDP benefits everyone, ecological economists highlight the tensions and conflicts between economic growth and the integrity of ecological processes/systems and human wellbeing (e.g. Martinez-Alier and Muradian, 2015).

EE is also associated with the concept of 'strong sustainability', which holds that the natural world performs certain critical functions that humans cannot replicate (Ekins et al., 2003). This contrasts with weak approaches to sustainability associated with neoclassical environmental economics, which while assuming varying degrees of substitutability between so-called natural and human capital, tend to measure ecological degradation and resource depletion in monetary terms (Martinez-Alier, 2004). EE also holds that industrial growth-based economies require the continuous extraction, transformation, and metabolisation of energy and materials, which eventually become waste and pollution (e.g. Haberl et al., 2021). Following Demaria (2017: 19), such an economy must eventually 'encounter limits to growth, not only for its inputs (e.g., peak oil), but also in relation to the assimilative capacity of its sinks, or ecosystems (e.g. climate change)'.

EE became institutionalised in 1988 with the establishment of the International Society for Ecological Economics (ISEE) (Røpke, 2004). However, the project of exploring the

[13] EE should not be confused with 'environmental economics'; a sub-field of neoclassical welfare economics that mobilizes principles and techniques associated with the latter to address environmental problems (e.g. Hanley et al., 2013).

energetic and material basis of 'economic' activity can be traced at least to the 1800s (Martinez-Alier, 1987). Amongst others, key influences on the field's development include Nicholas Georgescu-Roegen (1971), H.T. Odum (1972), K. William Kapp (1950), Kenneth Boulding (1966), Herman Daly (1977), and Karl Polanyi (1944).

The field has since grown rapidly with researchers exploring a diverse range of topics. In doing so, they have drawn on an equally diverse range of disciplines, theories, and thinkers. Reflecting on the above, Spash (2013: 352) identifies three camps within EE that illustrate how the field has become 'conflicted and divided'. The first are the 'New Environmental Pragmatists', who while motivated by environmental objectives, arguably remain uninterested in 'theoretical rigour, especially in the social sciences' (ibid: 355). For this group, environmentalism represents 'a practical problem-solving activity, not a fundamental critique of the dominant structure of political economy and its treatment of human relationships with Nature' (ibid.). Secondly, the 'New Resource Economists' regard EE 'as a sub-field of neoclassical economics', with the latter providing their theoretical and philosophical foundation (ibid: 356). Finally, 'Social Ecological Economics' represents a scientific and ethically grounded critique of neoclassical economics, which aims to dismantle and replace the latter with insights from other schools of political economic thought (e.g. critical institutionalist, feminist, evolutionary, Marxist, post-Keynesian etc.). This project of transforming economic thinking and pedagogy is a corollary of social ecological economics' more fundamental ideological purpose: to elucidate the injustices, social inequities, and power relations 'inherent in current environmental problems with a recognised need for fundamental changes in the structure of economic systems and human behaviour' (ibid: 358). While Spash's typology does not do justice to the full range of positions within EE (Dube, 2021), it offers a useful heuristic to help navigate some of the key fault lines that characterise this field. For this thesis, this typology enables a broad location of

ecological distribution conflict debates within the tradition of *social* ecological economics.[14]

2.3 Political ecology

The field of political ecology (hereafter PE) is united by the argument that all ecological concerns are at root political ones (Forsyth, 2003; Neumann, 2005). PE explicitly distinguishes itself from 'apolitical ecologies'; that is while PEs are explicit about their normative assumptions, apolitical ecologies tend to elide these with managerialist discourses and claims of value-free objectivity (Robbins, 2012). This focus on 'the political' raises questions of power; especially if, following Paulson et al. (2003: 209), politics 'is understood as the practices and processes through which power, in its multiple forms, is wielded and negotiated'. This foregrounds a broad understanding of 'politics', encompassing a myriad of political actions and interests that extend far beyond formal political processes into the realm of 'civil society' (Bryant and Bailey, 2005); particularly as they unfold in five key areas: *degradation and marginalization*, *environmental conflicts*, *environmental identity*, *social movements*, and *conservation and control* (Robbins, 2012).

Although the term appeared in the late 1960s (Forsyth, 2003) and became increasingly prominent in the 1970s (for example, through the pioneering works of Andre Gorz [e.g. 1975]), it was only in the 1980s that prior developments in other fields - most notably radical development geography and cultural ecology - crystallised into an identifiable field called PE (Bryant and Baily, 2005). Since its emergence, the field's chief emphasis 'has been on the empirical application of a broadly defined political economy to the political and ecological problems of the Third World' (ibid: 10).[15] These 'Third World' PEs have sought to elucidate how multi-scalar processes of socio-ecological change

[14] NB This chapter draws on several sources that were published after the stated (December 2020) end date of my empirical study (see chapter 5). This is indicative of the non-linear/iterative approach I adopted in this project. Consequently, the vast majority of this chapter was written between 2021 and 2023.

[15] However, please see the pioneering works of Gorz (1975, 1987), a key figure in the development of political ecology, for notable earlier political ecology works focused on 'the Global North'.

have impacted particular communities and their livelihoods (Blaikie and Brookfield, 1987: 21). These early works helped undermine certain problematic assumptions regarding ecological degradation; for example, the Malthusian idea that environmental collapse is a necessary corollary of rising population and the pressures exerted by the latter on natural resources; or the notion that inadequate resource management practices at the local scale, or market distortions and interventions are the leading drivers of ecological degradation (Watts, 2000). At the same time, these early PEs helped elucidate how unequal relations of wealth, poverty, and power are deeply implicated in such degradation, while showing a distinct commitment towards the poor, the exploited, and the vulnerable (ibid.). This latter orientation enabled these early works to highlight the abilities of marginalised actors (e.g. situated knowledges and practices) as well as the constraints under which they operate (e.g. how political economic relations can incentivise ecologically degradative activities) (ibid.). However, these early PEs were frequently critiqued for their underdeveloped gender and discursive dimensions. Furthermore, this work tended to be confined to rural locations in the 'Global South', and so has also been criticized for its narrow geographical focus (e.g. McCarthy, 2002). However, since the 1990s these critiques have been largely addressed. For example, recent studies focusing on environmental conflicts are typically more sophisticated in their treatment of politics and discourse (e.g. Rodriguez-Labajos and Martinez-Alier, 2015), while feminist PEs have addressed previously neglected gender dimensions (e.g. Rocheleau, 1995). Meanwhile, the field's geographical horizons have been expanded into urban locations (e.g. Swyngedouw and Heynen, 2003), 'the Global North' (e.g. McCarthy, 2002) and the planetary scale (e.g. Peet et al., 2010).[16]

While there are competing interpretations of PE, it is possible to identify some common assumptions. Bryant and Bailey (2005) identify three key assumptions that underpin PE scholarship: First, environmental change is associated with benefits and costs that are not distributed equally amongst actors. Second, these unequal

[16] See previous footnote.

distributions of environmental benefits and costs serve to reinforce or reduce existing inequalities. In this regard, 'any change in environmental conditions must affect the political and economic status quo, and vice versa' (ibid.: 28). Finally, the unevenly distributed impacts of environmental change often reconfigure power relations between different groups (ibid.). Similarly, Robbins (2012: 87) argues that PE is a form of expression that narrates stories 'of justice and injustice'. This involves tracking the 'winners and losers to understand the persistent structures of winning and losing' (ibid.). However, a central feature of political ecological analysis must be to apprehend the patterned nature of winning and losing; and the extent to which these patterns reflect wider structures, institutions, and processes that produce such outcomes by design (ibid.). Finally, while PE seeks to expose and critique existing power relations and injustices, it usually does so with an eye towards informing, nurturing, and empowering progressive political ecological change (ibid.).

There are nevertheless several distinct (if overlapping) currents within the field - e.g. feminist PEs (Rocheleau, 1995), urban PEs (Swyngedouw and Heynen, 2005), post-structuralist PEs (Escobar, 1996). The ecological distribution conflict debates this thesis addresses are associated with the 'Barcelona School of PE' (e.g. Villamayor-Tomas and Muradian, 2023), which has grown around – and remains deeply influenced by – the pioneering work of Joan Martinez-Alier (e.g. 1971, 1977, 1985, 1987, 1995, 2002, 2004, 2009). A central figure in the development of PE and EE, Martinez-Alier has been credited with building 'bridges between these two fields' (Villamayor-Tomas et al., 2023: 19). Such bridge building is evident in the School's 'interlink[ing] [of] material and energy flows with ecological distribution conflicts' (Gerber and Scheidel, 2018: 187).[17] Thus, while material and energy flows are a central concern of EE (e.g. Schiller, 2009), Martinez-Alier (2002: 30) defines PE as 'the study of ecological distribution

[17] This interlinking of EE and PE, combined with the enduring and pioneering influence of Martinez-Alier in bringing these two fields into dialogue, has recently given rise to talk of a 'Barcelona School of Ecological Economics and Political Ecology' (e.g. Villamayor-Tomas and Muradian, 2023).

conflicts'. According to Kallis (cited in Demaria, 2017), the Barcelona School can be distinguished by the following characteristics:

- A desire to amplify the voices of environmental justice activists engaged in EDCs, enabling them to bring their concepts and theories into dialogue with academic ones
- The argument that the poor, whose metabolisms are miniscule compared with those of the rich, are the real environmentalists
- Critiquing capitalism and its insatiable metabolism, while exploring the conditions and potential for socio-ecological transformation through alternatives (e.g. commons, degrowth, post-extractivism, alternative economies, etc.)
- Engagement with a diverse range of theories 'to explain conflicts, and empower political alternatives' (ibid.: 29).

While this PhD thesis is broadly aligned with these principles, it is also motivated by a desire to provide a more substantive analysis of the political economic drivers and dynamics of ecological distribution conflict, a concept to which I now turn. Indeed, despite their many insights, existing explanations of ecological distribution conflict contain several problematic assumptions that constrain their ability to 'explain conflicts, and empower political alternatives' (ibid.: 29).

2.4 Ecological distribution conflict

First proposed by Martinez-Alier and O'Connor (1996), the term ecological distribution conflict (EDC) has intellectual roots in political economy, specifically in its concept of economic distribution conflict. However, whereas the latter denotes struggles over income distribution (e.g. between labour and capital or landlords and tenants), EDC concerns struggles over the distribution of *environmental harms* (e.g. exposure to pollution) and *benefits* (e.g. access to natural resources). The latter, occur at every stage of 'the commodity chain' in places of resource extraction, manufacturing, transport infrastructure, and waste disposal (Martinez-Alier, 2004).

EDC scholarship argues that unjust distributions of power and resources typically go hand in hand with unequal distributions of environmental burdens (e.g. pollution and waste) and benefits (e.g. access to fertile land or natural resources). EDCs typically emerge when communities mobilise against specific material-economic endeavors whereby ecological impacts constitute a key area of concern (Temper et al., 2015). These mobilisations frequently give rise to environmental justice movements that 'become key actors in politicizing… unsustainable resource uses', while 'sometimes also [taking] radical actions to stop them' (Scheidel et al., 2018: 585). Consequently, some EDC scholars have argued that the environmental justice campaigns that arise from these conflicts can be important agents of sustainability (ibid). Since such campaigns confront the powerful institutions and actors that perpetuate unsustainability and social ecological injustice, they are uniquely positioned; not only to halt the expansion of harmful projects, but to help catalyse the radical social and political economic transformations that sustainability and environmental justice requires (ibid). The questionable political economic activities that give rise to these conflicts are invariably driven by more powerful actors in government and/or business (Temper et al., 2018a).

While EDCs typically involve clashes between actors with conflicting material interests, they are also 'expressed as conflicts over valuation, either inside a single standard of value or across plural values' (Martinez-Alier, 2009: 86). For example, a mining company might reach an agreement with certain groups to financially compensate them for loss of livelihood/health/wellbeing resulting from the firm's activities. However, such an agreement can only be reached once those involved accept (or relent to) 'value commensurability' and the dominance of a 'common language of economic valuation' (ibid.). Value commensurability concerns the ability to reduce a diverse array of cultural, social, economic, and environmental concerns into monetary units and - most crucially - to have the power to ensure that others accept this reductionism (ibid.). However, as Martinez-Alier notes, the dominance of monetary valuation can serve to delegitimise other types of values. For example, those pertaining to sacredness, human rights, territorial rights, aesthetic, cultural, and

ecological values (ibid.). However, as indicated by the global proliferation of EDCs, the uncontested dominance of the idiom of economic valuation is far from given (e.g. Temper et al., 2015).

Since 2012, the Environmental Justice Atlas (EJAtlas), an open-source map and database co-produced by academics and environmental justice activists, has documented this global proliferation of EDCs. Although there are likely to be many more EDCs that remain undocumented, by January 2021 the EJAtlas had registered 3350 entries; almost three times more than the 1357 conflicts documented up to 2016. The majority of these conflicts are located at the frontiers of resource extraction (e.g. mining, oil and gas extraction) and waste disposal (e.g. landfill, shipbreaking, incineration) (Martinez-Alier, 2021).[18]

Within the literature, there is general agreement regarding the key features of EDC (as described above). There also seems to be a consensus that EDCs are becoming increasingly prevalent (e.g. Conde, 2017; Martinez-Alier, 2021). However, the literature is more divided about what the EDCs' fundamental drivers are. Of course, the emergence of any conflict will always be contingent on a range of factors. However, to understand why EDCs are becoming increasingly prevalent globally, we must identify what is driving them 'at a fundamental level' (Pirgamier and Steinberger, 2019: 4). Two broad, highly interrelated, categories of explanation seek to answer this question: *socio-metabolic growth and changes explanations* and *Marxist explanations*.

2.4.1 Socio-metabolic growth and changes explanations

Until recently, *socio-metabolic growth and changes explanations (SMGACEs)* of EDCs were the most common in the literature (e.g. Martinez-Alier, 2009; Martinez-Alier et al., 2016; Perez-Rincon et al., 2018). *SMGACEs* typically foreground the role of 'growth and changes in the social metabolism' as the main driver of EDCs. For example:

[18] The EJAtlas can be accessed here: https://ejatlas.org/

> Conflicts arise because of the growth and changes in the Social Metabolism…Even a non-growing industrial economy would require new supplies of fossil fuels and other materials from the commodity extraction frontiers because energy is not recycled and materials are recycled only in part. The economy is not circular, it is entropic. There are therefore many resource extraction and waste disposal conflicts (Perez-Rincon et al., 2018: 82).

SMGACEs draw heavily on concepts and insights from EE. Firstly, they draw on the concept of the social metabolism (e.g. Haberl et al., 2021). This concept is founded upon the insight that, much like ecosystems or biological organisms, socio-economic systems also require a constant throughput of energy and materials to maintain their internal processes and functions; while expansion of such systems entails a rising throughput (Scheidel *et al.*, 2018). First articulated by Joan Martinez-Alier (2007), a core proposition of SMGACEs is that rising social metabolism is concomitant with increasing EDCs. As Scheidel (2023) explains, this proposition is underpinned by core insights from EE; especially the understanding that industrial economies are entropic, rather than circular (Georgescu-Roegen, 1971). Thus, while energy cannot be recycled, materials can only ever be recycled to a limited degree (Giampietro, 2019). Consequently, even a stationary industrial economy would demand 'constant new inputs of energy and materials from the commodity extraction frontiers' while generating concomitant outputs of pollution, emissions, and unrecycled waste (Martinez-Alier, 2022: 1182). While this reality exerts huge strains on energy/material sources and sinks (e.g. the atmosphere, soils, seas, and rivers that are increasingly struggling to absorb the social metabolism's outputs), an expanding social metabolism, whether at the national or global scale, only serves to intensify these strains. Moreover, in a world characterised by long-standing inequalities and unequal power relations, the social ecological benefits and burdens of socio-metabolic growth and change are felt unevenly, both spatially, and across different social groups (Martinez-Alier, 2009). These differential impacts generate EDCs, which can be 'observed and analysed at the input, throughput, and output side of the economy (i.e. at the stages of resource extraction, transport and processing, and waste disposal)' (Scheidel, 2023: 183).

To illuminate how these differential impacts are produced through unequal power relations, SMGACEs frequently mobilise the concept of cost-shifting (e.g. Martinez-Alier, 2012). Borrowed from institutionalist and proto-ecological economist William Kapp (1963), this concept was first developed to overcome weaknesses in neoclassical welfare economics' debates regarding the problem of so-called 'externalities'. While both concepts explain the phenomenon of third parties being made to bear the costs of business activity, each conceptualises the problem differently. Whereas neoclassical welfare economists tend to regard externalities as minor aberrations to otherwise well-functioning markets, Kapp's (1963) analysis suggests that cost-shifting strategies are endemic to market economies (Spash, 2021). Thus, contrary to the notion that such phenomena represent instances of 'market failure' that can be corrected through price adjustments, cost-shifting 'successes' are central to the attainment of profit and business growth (Kapp, 1963). Drawing on the above, SMGACEs demystify how, in a context of socio-metabolic growth and changes, powerful corporations and governments systematically shift their social ecological costs onto less powerful groups and wider society, thus generating EDCs (e.g. Martinez-Alier et al., 2012).

Beyond the insight that a larger social metabolism yields more conflicts, Scheidel (2023) highlights how SMGACEs also offer important lessons regarding the qualitative aspects of social metabolism and their role in EDCs. Here, he identifies three further SMGACEs insights that are useful for elucidating the interrelations between the social metabolism and EDCs. Firstly, '*the more ecologically harmful the extracted, processed, and disposed materials are, the higher their potential to provoke social conflict*' (ibid.: 185). Thus, when considering the unequal distributions of harms and benefits associated with the social metabolism, quality frequently trumps quantity as a decisive factor generating EDCS. Here, Scheidel contrasts the huge quantities of sand, stone and other construction materials metabolised annually with the significantly smaller socio-metabolic profiles of nuclear waste, uranium, and other extremely toxic substances. Thus, while extraction concerning the former group does generate EDCs, that pertaining to latter has a much higher propensity to generate conflicts due to the

elevated risk perceptions they provoke in the social groups exposed to them (e.g. EJAtlas, 2021).

The second key lesson Scheidel (2023: 186) takes from SMGACEs 'is that *the more immediate the risk perception of adverse impacts resulting from resource uses is, the higher their potential to provoke social conflict*'. Here, Scheidel identifies two important, albeit highly interrelated factors. Firstly, the temporal immediacy of adverse impacts stemming from the social metabolism. Thus, since some socio-metabolic risks/harms can take many years to accumulate in the environment, EDCs frequently do not arise until those risk/harms begin to be felt by those that are exposed to them. Scheidel illustrates this point with the example of belated EDCs over health problems stemming from accumulative exposure to agroecological chemicals used to facilitate biomass extraction (e.g. Navas et al., 2018). The second factor concerns the level of risk (perception) different social groups attach to the social metabolism's negative impacts. Scheidel (2023) illustrates this point with the example of climate change. Thus, although the worst impacts of climate change will be felt in the future, rising risk perceptions regarding these impacts are increasingly informing conflicts concerning this issue and fossil fuel extraction (e.g. Temper et al., 2020).

The third key insight Scheidel draws from SMGACEs 'is that *the greater the proximity of social groups to adverse impacts from resource uses, the higher their potential to provoke social conflict'* (ibid.: 186). Social groups that live closest to polluting and/or environmentally degradative infrastructures are more likely to be adversely impacted by such infrastructures, thus increasing their propensity to mobilise in response. Consequently, the spatial configuration of the social metabolism and the proximity of human settlements and population centers to its harmful social ecological impacts can play a key role both in precipitating and shaping EDCs (ibid.).

The final insight Scheidel (2023) draws from SMGACEs is the importance of considering scale when analysing the interrelations between social metabolism and EDCs. This is because socio-metabolic changes at the global and national scales frequently articulate themselves differently in the localities where EDCs unfold. To illustrate this point,

Scheidel notes how localised EDCs over the creation of conservation areas can be understood not as responses to an augmented local social metabolism. On the contrary, such EDCs typically arise due to (the threat of) a drastic reduction in the local social metabolism as the creation of new conservation areas frequently involve evictions, prohibitions and/or restrictions of customary resource harvesting (e.g. Brockington and Igoe, 2006). However, as Scheidel (2023) explains, when considered from a national or global perspective, the impetus for creating new conservation areas to facilitate ecological recovery is intimately tied to parallel moves enabling the expansion and intensification of resource extraction in other locations. Consequently, the hypothesis that a larger social metabolism equals more EDCs is most applicable to the global and national scales, whereas at the local scale conflicts can also be provoked by reductions in the social metabolism (ibid.).

Beyond the insights outlined above, SMGACEs are also important for illuminating the disparities, inequalities, and injustices in energy and resource consumption, both within nations and globally (e.g. Hornborg and Martinez-Alier, 2016). Relatedly, SMGACEs also serve to clarify how such ecologically unequal exchange between the Global South and the Global North translates into more EDCs and environmental injustices in the former; especially in the indigenous areas where the commodity extraction frontiers are most frequently located (e.g. Temper et al., 2015; Scheidel et al., 2020).

Reflecting on the above, it becomes apparent that SMGACEs usefully elucidate the biophysical underpinnings of differential social power. An important strength of SMGACEs is that such explanations apply regardless of the specific form of social organisation involved. For example, while global capitalism is arguably the most consequential driver of socio-metabolic growth and changes, a resource-intensive autocratic monarchy or planning economy would arguably also give rise to EDCs (Scheidel, 2023). However, a socio-metabolic approach can only tell us so much about the social and political economic power relations that drive EDCs (Demaria, 2017; Pirgmaier and Steinberger, 2019; Scheidel, 2023). Indeed, as noted by Scheidel (2023: 188), while an important strength, SMGACEs analytical flexibility regarding their

applicability to diverse forms of social organisation is simultaneously a 'weakness for explaining the ultimate drivers of environmental conflicts'. Here, it is worth considering the strong influence of EE' 'pre-analytic vision' on SMGACEs (Pirgmaier, 2018: 2).

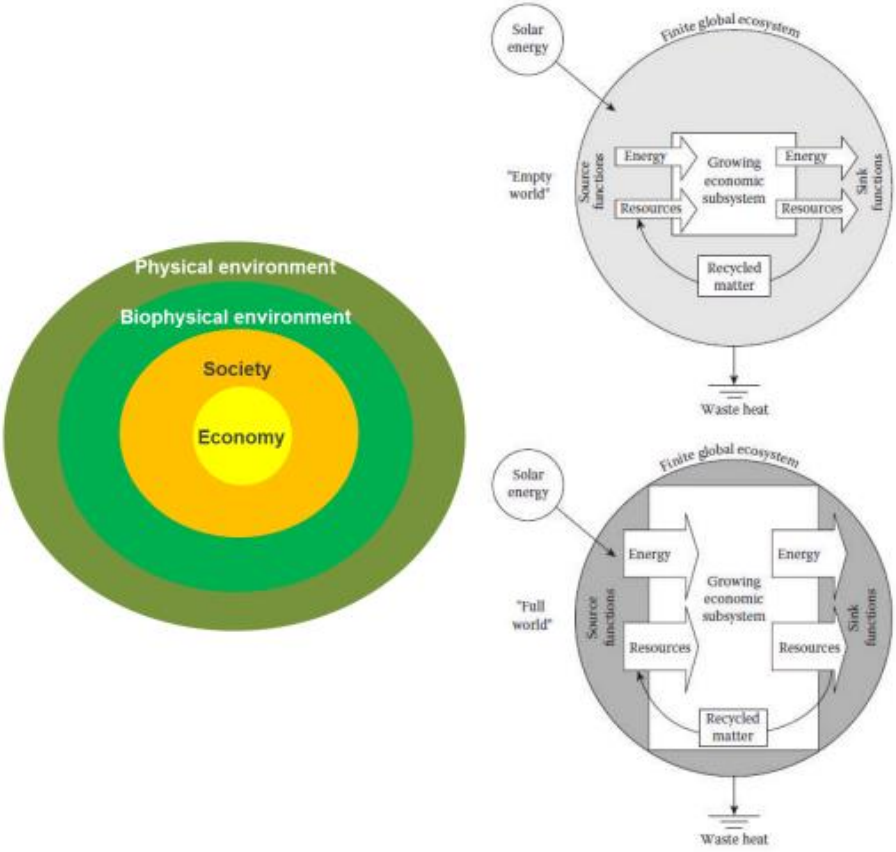

Figure 2.1 Ecological economics' pre-analytic vision
Source: Pirgmaier, 2018: 3

Depicted in Figure 2.1, this pre-analytic vision conceptualises 'the economy' as a subsystem of society which is, in turn, embedded in the biophysical environment. As noted by Pirgmaier (2018: 3-4), according to this vision, 'all economic processes' are conceptualised as 'social and ultimately natural processes in terms of biological, physical and chemical transformations and as such subject to the laws of thermodynamics'. While this conceptualisation places great emphasis on the biophysical foundations of all economic activity, it also acknowledges the key role of

social processes in driving that activity. Notwithstanding this, EE tends to do a better job of elucidating the former (rather than the latter). Pirgmaier (2018) argues this is due to the way in which 'the economy' is conceptualised in this pre-analytic vision: as a black box that receives inputs of energy and materials from the biosphere which then emerge from the other side in the form of waste.

As demonstrated above, EDC research that produces *SMGACEs* regularly uncovers important 'social, spatial, and temporal asymmetries or inequalities in the use by humans of environmental resources and services' (O'Connor and Martinez-Alier, 1996: 160). Therefore, such research does offer meaningful glimpses inside the black box. However, when it comes to situating these important insights within a broader political economic analysis of what is driving the global proliferation of EDCs, EE' pre-analytic vision frequently comes to the fore. This is arguably reflected in *SMGACEs'* tendency to 'overemphasise growth in economic and biophysical terms at the expense of underpinning social drivers of ecological destruction' (Pirgmaier and Steinberger, 2019: 5). For Pirgmaier and Steinberger (2019: 5), this issue is linked to the tendency within the field of EE to confuse the 'intermediate…drivers of ecological overshoot and social crises' – e.g. fossil fuel/mineral extraction and technological development – for its more fundamental political economic drivers. Rather than being a fundamental driver of such phenomena, growth is arguably an emergent consequence of capitalism: a historically specific political economic system that is now globally hegemonic. Consequently, understanding the political economic drivers of EDC requires a focus on the specificities, processes, and dynamics of this system- rather than some ahistorical 'economy' (Pirgmaier, 2018). However, *Marxist explanations of EDC* are not without their own problems, discussed below.

2.4.2 Marxist explanations

Despite the name, *Marxist explanations* are not purely Marxist in content, typically containing other influences, consequently allowing a degree of variation within this category. Here, two broad types of *Marxist explanation* are identified: *the classical variant* and *the world ecology variant*.

2.4.2.1 Marxist explanation 1: The classical variant

The classical variant (e.g. Demaria and D'Alisa, 2013; Demaria, 2016; Demaria, 2017; Scheidel et al., 2018) draws strongly on 'classical Marxism' and the political economic writings of Karl Marx (1976). Other key sources of inspiration for *the classical variant* include Marxist geographer David Harvey's (2003) writings on 'accumulation by dispossession', proto-ecological economist William Kapp's (1963) work on 'cost-shifting', and feminist economics (e.g. Beneria et al., 2015). *The classical variant* also draws important insights from *SMGACEs* (e.g. Martinez-Alier, 2009) and EE more generally (e.g. Haberl, et al., 2021). Consequently, *the classical variant* largely agrees with *SMGACEs* regarding the positive relationship between socio-metabolic growth/change and EDCs. However, in line with the Marxist critique of *SMGACEs* discussed above, *the classical variant* foregrounds capital accumulation as a fundamental driver of social metabolism (Demaria, 2017). In line with this political economic sensibility, Scheidel et al. (2018: 587) - following Demaria and Schindler (2016) - 'propose…the term "socio-metabolic configurations" to refer to both biophysical and social aspects of society's metabolism'. Drawing on the example of Delhi's waste metabolism, they note how the latter is intimately linked to the throughput of waste, and the means by which such waste is produced and processed. The biophysical/material aspects of this socio-metabolic configuration concern the size, calorific value, and material composition of waste processes, and their physical transformation and trajectory. Meanwhile, the political economic aspects of Delhi's waste metabolism concern its management: that is, how and where is this metabolism managed, by whom, and in whose interests? Relatedly, other important aspects concern how something comes to be regarded as waste, the intuitions and laws governing it, and the forms of valuation they prioritise/exclude. Thus, to apprehend the relationship between social metabolism and EDC, it is not sufficient to just focus on the quantities and distributions associated with biophysical flows. Indeed, we must also explore 'the power relations that configure them' (ibid.: 587).

Drawing on Marxist political economy, *the classical variant* foregrounds capital accumulation in its explorations of these power relations; focusing specifically on its

crucial role engendering contentious socio-metabolic configurations and the EDCs they generate (e.g. Demaria and D'Alisa, 2013; Demaria, 2016; Demaria, 2017; Scheidel et al., 2018). Here, capital accumulation is typically conceptualized as a bifurcated phenomenon with two distinct modes: (1) an 'economic' mode based on expanded reproduction (i.e. the process whereby surplus value is produced and capitalised through the exploitation of wage-labour); and (2) an 'extra-economic' mode which can take two forms: (a) dispossession, which entails labourers being separated from their means of production; or (b) contamination, which occurs when capital endangers 'the means of existence' (and subsistence) by shifting its social and environmental costs onto others (ibid: 587). This formulation, which is based on Demaria and D'Alisa's (2013) unique synthesis forms the basis of several *classical variant* (Marxist) explanations in the literature (e.g. Demaria and D'Alisa, 2013; Demaria, 2016; Demaria, 2017; Scheidel et al., 2018).[19] Figure 2.2 is a visual representation of this synthesis. Its theoretical core, the conceptualisation of accumulation as a bifurcated phenomenon that can take two paths ('economic' or 'extra-economic'), is based on Marxist geographer David Harvey's (2003) theory of accumulation by dispossession (AbD), which in turn draws heavily on Marx (1976); especially the latter's concept of primitive accumulation (PA). Meanwhile, (proto-) ecological economist William Kapp's (1963) theory of cost-shifting, in dialogue with feminist economics (e.g. Beneria at al., 2015), enables Demaria's key theoretical contribution: the argument that, in addition to dispossession (Harvey, 2003), 'extra-economic' accumulation can also be achieved via contamination (Demaria, 2017).

[19] Although Demaria and D'Alisa (2013) developed these ideas together, they have been most fully developed in Demaria's (2017) PhD thesis. For this reason, in the forthcoming paragraphs, I draw more heavily upon the latter.

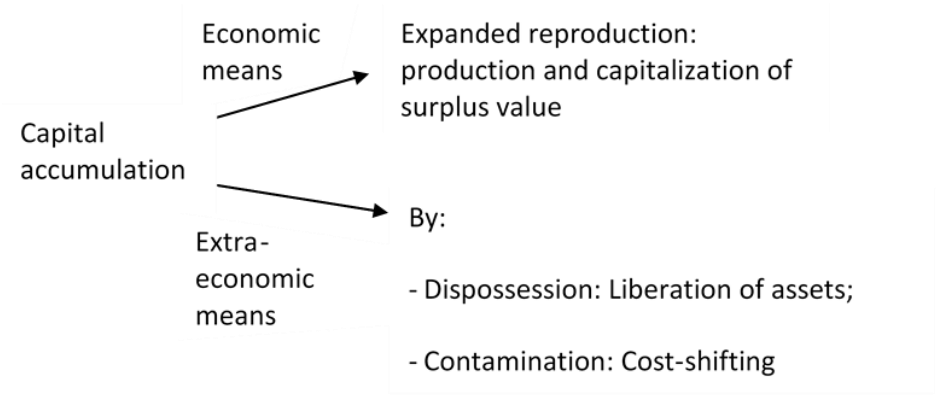

Figure 2.2 Demaria's and D'Alisa's (2013) synthesis
Source: Demaria, 2017: 165

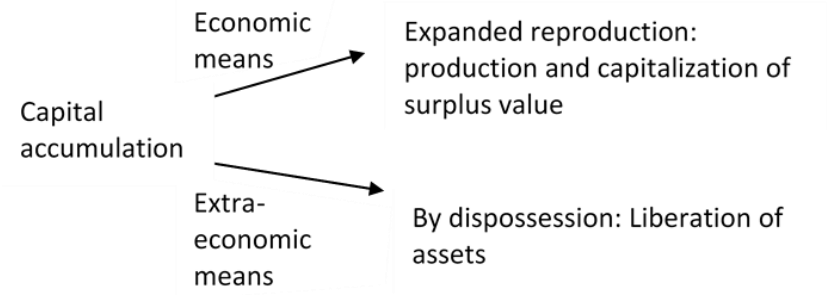

Figure 2.3 Harvey's bifurcation: two routes to accumulation
Source: Adapted from Demaria, 2017: 165

The extent of Harvey's (2003) influence on Demaria (2017) - and *the classical variant* more broadly - becomes apparent when comparing Figure 2.2 and Figure 2.3 (above). Figure 2.2 depicts Demaria's (2017) understanding of capital accumulation, while Figure 2.3 depicts that of Harvey (2003). Aside from the absence of Demaria's (2017) key contribution from Figure 2.3 (the sub-category of accumulation by contamination through cost-shifting), both figures are identical, each depicting accumulation as a

bifurcated phenomenon which can take two basic routes: 'economic' or 'extra-economic'. In Section 2.4.2.3, I will argue that this latter assumption is a key barrier to elucidating the fundamental role of power; both as a key driver of, and decisive variable within, EDCs. Since *the classical variant* borrows this and other problematic assumptions from Harvey (2003), to gird my forthcoming critiques of *the classical variant* (and *Marxist explanations* more broadly), it is worth taking a short detour into Harvey's (2003) writings on AbD.

Harvey's (2003) theory of AbD contributes to a longstanding debate within Marxist thought regarding the dual nature of capital accumulation. Or, more specifically, the extent to which capital accumulation is driven by (extra-economic) processes of 'predation, fraud, and violence' (Harvey, 2004: 74) on the one hand, and the 'stern laws of economics' (ibid: 79) on the other. As noted by Nichols (2015: 18), this debate could be characterised as a series of attempts by theorists to '…explicate, correct and complement Marx's discussion of the "so-called" primitive accumulation of capital...'.

Marx (1976) uses the term PA to denote the historical processes that enabled the 'original accumulation' of capital. That is, those earliest forms of accumulation, achieved through state power and violence, that both preceded and enabled subsequent rounds of accumulation via the (comparatively pacific) labour process and expanded reproduction. According to Marx's historical account of PA (and its protagonistic role in the transition to capitalism), during the 15th and 16th Centuries, the emergent European capitalist class - the key protagonist in Marx's account of the transition to capitalism - cemented its position through a series of epoch-making revolutions to the social order (ibid.). Although Marx regarded PA strategies to be indispensable to the historical emergence of capitalism, he believed they would decline in importance. Thus, once capitalist property relations had become normalised, accumulation would mostly proceed via 'economic' means through the labour process and expanded reproduction, which Marx conceptualised as the only source of value under capitalism (ibid.).

There is ongoing debate hinging on the question of whether PA is principally a historical phenomenon; or whether PA processes continue to play a key role up to the present. For Harvey (2003) and others (e.g. De Angelis, 2001), the former position (e.g. Dobb, 1963) elides how many of the PA processes Marx originally identified 'have remained powerfully present within capitalism's historical geography' (Harvey, 2003: 74). According to Harvey, these contemporary PA processes

> include the commodification and privatization of land and the forceful expulsion of peasant populations; conversion of various forms of property rights – common, collective, state, etc. – into exclusive private property rights; suppression of rights to the commons; commodification of labour power and the suppression of alternative, indigenous, forms of production and consumption; colonial, neo-colonial and imperial processes of appropriation of assets, including natural resources; monetization of exchange and taxation, particularly of land; slave trade; and usury, the national debt and ultimately the credit system (ibid.).

Since Harvey (2003) regards these forms of 'extra-economic' accumulation to be central to contemporary capitalism, he argues that the adjectives typically used to describe them – 'primitive' and/or 'original' – are misnomers. Instead, he proposes the term *accumulation by dispossession* (AbD) as an alternative, more precise, description of contemporary capitalism's reliance on 'extra-economic' state power and violence.

Throughout capitalism's history, Harvey (2003) argues, the balance between these two types of accumulation has shifted back and forth. In some eras, the labour process/expanded reproduction (i.e. 'economic' accumulation) has been the chief source of capitalism's dynamism, while in other periods AbD ('extra-economic' accumulation) has taken the lead. According to Harvey (2003), AbD provides capitalists with an avenue to escape crises which occur when the mass of accumulated capital exceeds the number of profitable investment opportunities in the 'economic' realm of production and trade. For example, he argues that between 1945 and the early 1970s, ('economic') accumulation via expanded reproduction was the principal driver of accumulation. However, from the early 1970s capital experienced yet another overaccumulation crisis, which was partly resolved via neoliberal era reforms that

enabled the increasingly aggressive pursuit of 'extra-economic' accumulation through AbD (Harvey, 2003; Nitzan and Bichler, 2006).

Demaria (2017) regards AbD as a useful concept for explaining EDC. Especially conflicts that arise when capital - backed by state power/violence - attempts to appropriate resources from less powerful actors. He illustrates this point with reference to an EDC over solid waste in Delhi, India. Here, capital's attempts to appropriate and commodify solid waste - at the expense of informal waste pickers (whose livelihoods depended on this resource) - constituted a key point of contention. Demaria therefore argues that EDCs driven by AbD are principally concerned with ownership/control over the 'means of production' or 'means of subsistence'. While the former refers to all the physical elements (except human beings) that are required to produce goods and services at a scale beyond mere subsistence, 'means of subsistence' refers to those elements that 'direct producers' rely on to reproduce themselves and their families/communities. Typically, the term is used in the context of rural communities where 'farmers and small-scale producers of non-agricultural products…depend on ecosystems for their livelihoods' (ibid.: 113). However, Demaria applies this concept in urban Delhi, where the livelihoods of informal 'wastepickers' had come to depend on a socio-metabolic configuration that afforded them access to significant quantities of recyclable materials (ibid.).

While acknowledging AbD's key role in driving EDCs over 'the means of subsistence', Demaria (2017) argues that there is another important driver of EDC that cannot be explained using the classical Marxist idiom of social property relations. Consequently, he posits the existence of an additional 'extra-economic' capitalist strategy for 're-launch[ing] the capitalistic relation and find[ing] new profitable opportunities for…over-accumulated capital' (ibid.: 164). According to Demaria, this strategy, which he terms accumulation by contamination (AbC), is

> the process by which the capital system socializes costs, through successful cost-shifting, which degrades the *means of existence* and bodies of human beings in order to find new possibilities for capital valorization... (Demaria, 2017: 170, my emphasis).

Here, Demaria (2017) draws inspiration from proto-ecological economist Kapp (1963) as well as feminist economists such as Beneria et al. (2015). From Kapp (1963), Demaria borrows the concept of cost-shifting. As discussed previously (see section 2.4.1), drawing on Kapp (1963), ecological economists (e.g. Spash, 2021) and SMGACEs of EDC (e.g. Martinez-Alier et al., 2012) explore how corporations systematically shift their socio-ecological costs onto less powerful third parties and wider society. It is this latter understanding cost-shifting which informs Demaria and D'Alisa's (2013) concept of AbC. Alongside cost-shifting, AbC relies on another important concept: 'the means of existence'. Demaria refers to these as

> those means that are necessary for the physiological reproduction of both human and non-human life, although not directly (but of course often indirectly) necessary for production. Examples could be the air we breathe, the food we eat or the water we drink, but also ecosystem services (i.e. a certain climate) or, following the feminists, carework (2017: 163).

Whereas 'the means of production' concept emphasises property relations, 'the means of existence' foregrounds feminist concerns regarding the realm of social reproduction (e.g. Beneria 2015). Thus, the means of existence primarily concern those physiological needs whereby a being's survival depends on certain metabolic requirements being met (Demaria, 2017). Since these needs/requirements constitute 'the *condicio sine qua non* for life', the importance of the means of existence cannot be overstated (ibid.: 163). However, while AbC can threaten 'the means of existence' of society at large (e.g. the climate crisis), the consequences of this so called 'extra-economic' accumulation strategy are invariably felt most acutely by society's most vulnerable groups (e.g. indigenous communities or subsistence farmers in the Global South) (Demaria, 2016).

2.4.2.2 Marxist explanation 2: The world ecology variant

While there is some variation within the *world ecology variant* (e.g. Schindler and Demaria, 2020; Schindler and Kanai, 2018), its coherence as a category is derived from the strong influence of Jason Moore's (e.g. 2014, 2015, 2017a, 2017b, 2018) 'world ecology' synthesis. In addition to classical Marxism (e.g. Marx, 1976), this synthesis draws on an eclectic mix of theoretical approaches that include Marxist geography

(e.g. Harvey, 1982) world systems theory (e.g. Wallerstein, 1974; Arrighi, 1994), ecological Marxism (e.g. Foster et al., 2010), feminist political economy (e.g. Mies, 1986), sustainability science (e.g. Steffen et al., 2007), and post-humanism (e.g. Haraway, 1988).

Despite their differences, *the world ecology variant* has multiple synergies with its classical counterpart. Most of these synergies can be traced to the influence of classical Marxism (e.g. Marx, 1976) and Marxist geography (e.g. Harvey, 2003) on Moore's (e.g. 2015) world ecology synthesis (e.g. Moore, 2015); and, also, to that of EE and PE (e.g. Martinez-Alier, 2002) on *the world ecology variant* (e.g. Schindler and Demaria, 2020). While expressed quite differently, *the world ecology variant* also relies on an ontological separation between accumulation's 'economic' and 'extra-economic' aspects. However, within this variant, 'extra-economic' processes of appropriation and dispossession arguably play an even stronger systemic role than they do in *the classical variant*.

My previous exploration of *the classical variant* involved a short detour into one of its key influences (i.e. Harvey, 2003). As noted, this detour was purposefully undertaken to inform my forthcoming critique of *the classical variant* and *Marxist explanations* more broadly. In this sub-section, I take a similar detour; this time into Jason Moore's (e.g. 2015) world ecology synthesis (the central influence on *the world ecology variant).* However, on this occasion, I will elaborate Moore's synthesis first (the short detour), before exploring how *the world ecology variant* deploys these arguments. As per the previous sub-section (2.2.5.1), this is all preparative for my forthcoming critiques of *the world ecology variant* and *Marxist explanations* more generally.

Moore (2015) argues capitalism is entering a period of terminal crisis due to what he terms 'the end of 'Cheap Nature'; the latter comprising 'the "Four Cheaps" of *labour power, food*, *energy,* and *raw materials*' (ibid.: 17). Throughout its 500-year history, Moore argues, capitalism has expanded – and stabilised itself – through the successive production and transgression of 'commodity frontiers' (CFs). CFs are conceptualised as geographical spaces where previously non-commodified 'Cheap Natures' (i.e. 'the

"Four Cheaps"'), and their 'unpaid work/energy', are appropriated and absorbed into capital's ever-expanding circuits of accumulation (ibid.). The use of the adjective 'Cheap' serves to emphasise 'how capitalism appropriates work/energy and biophysical utility produced with minimal labor-power' (Moore, 2017a: 8). The concept of 'unpaid work/energy' includes all energy, work, and life that, while essential to capital accumulation, depend for their reproduction on processes external to 'the cash nexus'; that is, the domain of commodity production where surplus value is monetised (Moore 2018). While this essential work includes all work/energy provided by nature (e.g. the photosynthesis and fossilisation of plants), it also encompasses unpaid human work (e.g. the caring work which is usually undertaken in the home) (ibid.).

For capitalism to reproduce itself, 'the cash nexus' must remain modest compared to accumulation by appropriation. Thus, the 'islands of commodification' must forever remain 'surrounded by oceans of Cheap – or potentially Cheap – Natures': capitalism's lifeblood (Moore, 2017b: 188-189). This is why, Moore argues, throughout capitalism's history each great wave of accumulation has been preceded by the expansion of CFs. Rather than being external to capitalism, then, 'extra-economic' phenomena such as war, conquest, (neo)colonialism, imperialism, and other forms of AbD have, hitherto, played a central role in its stabilisation and expansion (Moore, 2015). Consequently, whereas classical Marxism has tended to conceptualise 'value to be an *economic* phenomenon with systemic implications', Moore argues 'the inverse formulation may be more plausible' (2017c: 329). Namely, that '[v]alue relations are a *systemic* phenomenon with a pivotal economic moment'. In other words, the 'pivotal economic moment' of value relations and the circuit of capital, remain highly dependent on the – more extensive and geographically expansive – 'extra-economic' processes that lie beyond that circuit: namely, the CFs where 'Cheap Nature' must continually be appropriated and brought into the circuit of capital in order to (re)energise it. For Moore, conceptualising value in this way 'allows us to connect the production and accumulation of surplus value with its necessary conditions of reproduction' (ibid.). However, for Moore (2014: 286), there are signs that 'capitalism's cheap nature strategy' is becoming increasingly harder to sustain. First, because new sources of

unpaid work, to the extent that they exist, are not materialising quickly enough (ibid.). Compared with past eras, there are few sources of 'Cheap Nature' left to exploit - or at least not on a large-enough scale to absorb the huge quantities of surplus capital that is searching for profitable investment opportunities. For example, while production from the world's major conventional oil and gas fields is declining, new discoveries are not being made quickly enough to compensate for these declines (Campbell, 2013). Second, 'the accumulation of waste and toxification is now threatening the unpaid work that is being done' (Moore, 2014: 308). Moore cites global warming and its deleterious impacts on crop yields (and 'the end of cheap food') as one worrying manifestation of this phenomenon (ibid.). This leads Moore to conclude that capitalism's condition could be terminal (ibid.).

Schindler and Demaria (2020: 2) subsequently argue the lack of 'a single "great" commodity frontier, whose exploitation could fuel an expansionary phase of global capitalism', has prompted investors to seek out less conventional sources of uncommodified resources that can be appropriated and monetised. Thus, while Schindler and Demaria (2020) broadly endorse Moore's (2015) 'end of cheap nature thesis', they argue the latter overlooks capital's efforts to create new localised commodity frontiers (LCFs) by appropriating and commodifying 'solid waste'. Their research explores how, in pursuit of this latter goal, capitalist interests, backed by state actors, have deployed strategies of dispossession and contamination in their efforts to reconfigure the social metabolism of waste. These reconfigurations have sparked EDCs, as those at the sharp end of these strategies have mobilised to defend themselves. To illustrate this point, they refer to the example of informal wastepickers in Delhi, who began to mobilise after the solid waste they had hitherto relied on for their livelihoods was appropriated by capitalist interests. Schindler and Demaria (2020) frame such waste conflicts as struggles over who will capture the value deriving from the 'socio-metabolic reconfiguration' of waste streams; and who will pay the costs thereof. In this regard, a fundamental rift in EDCs

> is between those whose labor creates value or are exposed to waste, and *more powerful* actors who, by virtue of their strategic position in the socio-metabolic

> system, can exercise control over flows of waste and demand rents (ibid.: 5, my emphasis).

As illustrated above, *the world ecology variant* shares its classical counterpart's concern to elucidate the unequal power relations that inhere in EDCs; especially those that arise following capital's state-backed efforts to achieve 'accumulation by extra-economic means'; whether through the appropriation of resources (AbD) or cost-shifting (ABC). However, to what extent do Marxist explanations enable us to fully elucidate the role of 'power…and its full spectrum' (Bichler and Nitzan, 2021: 116) in the proliferation and dynamics of EDC? This will now be discussed.

2.4.2.3 Marxist explanations' power problems

Marxist explanations provide useful insights regarding the political economic drivers/dynamics of EDCs and the unequal power relations that inhere within them. Importantly, both types of *Marxist explanation* elucidate how - in their pursuit of accumulation - capital-state coalitions regularly engage in various forms of appropriation and cost-shifting, which frequently provoke strong resistance from those who are adversely impacted by such strategies (e.g. Demaria and D'Alisa, 2013; Demaria, 2017; Scheidel et al., 2018; Schindler and Kanai, 2018; Schindler and Demaria, 2020). Similarly, the argument that, by precipitating an intensification of capitalist efforts to locate and produce new LCFs, 'the end of Cheap Nature' (Moore, 2015) constitutes a fundamental driver of EDC is also compelling (e.g. Schindler and Kanai, 2018; Schindler and Demaria, 2020). However, extending Cochrane's reflection on Moore (2015) to *Marxist explanations* more broadly, it is possible to accept many of these insights while simultaneously questioning the Marxist framework within which they are couched (Creorder, 2017). Thus, while broadly in agreement that appropriation, cost-shifting, and the search for 'Cheap Nature' play key roles in contemporary accumulation strategies and the EDCs they provoke (e.g. Schindler and Demaria, 2020), following Nitzan and Bichler (e.g. 2006, 2009, 2012), I question the notion that it is analytically useful to: (a) conceptualise accumulation as a bifurcated phenomenon that can be achieved either via 'economic' means or 'extra-economic' means; or (b) categorise processes of appropriation and cost-shifting under the latter

heading of 'extra-economic' accumulation. Beyond the unresolved problem of empirically isolating 'economic' accumulation from its 'extra-economic' counterpart, lie more fundamental issues that arguably go to the very foundations of political economic thought (Nitzan and Bichler, 2006, 2009; Bichler and Nitzan, 2012, 2021). While an exhaustive exploration of these foundations is beyond the scope of this review, a brief reflection on some of the key issues may be helpful.

Like their liberal counterparts, Marxist theories of capital rely on a conceptual separation between a 'political' sphere characterized by arbitrary power (i.e. the domain of appropriation, cost-shifting, PA, AbD etc.) and an 'economic' sphere characterized by the latter's relative absence and a significant degree of regularity/automaticity (e.g. Marx's 'law of value'). While this conceptual separation has been theorised in myriad ways by both Marxists and liberals (and with varying degrees of nuance/sophistication), in each instance the separation serves a key analytical function: namely, to undergird theories of capital and value that explain value/capital generation in terms of the logics/tendencies/laws of a relatively autonomous material-economic-productive sphere. This conceptual separation is analytically necessary for each camp (broadly defined) because it prevents arbitrary power from undermining their respective theories of capital/value and the key concepts underpinning them. However, if we accept Nitzan and Bichler's argument that, in contemporary capitalism, arbitrary power both drives and is thoroughly implicated in *all accumulation*, this poses significant problems for such theories. Crucially, this latter argument undermines the keystone of Marxist theories of capital/value/ 'economic' accumulation: the labour theory of value (LTV).[20] For if accumulation is dependent on myriad power relations/processes, which include but extend way beyond the realm of production, the notion that labour represents the *only* source of value under capitalism becomes difficult to justify. Moreover, this conceptual separation (between 'the political' and 'the economic') hinders analyses

[20] That is to say nothing of the many other issues facing the LTV. For an extended discussion of these issues, see Nitzan and Bichler (2009) Chapters 6 and 7.

seeking to illuminate the central role of power; not only in contemporary capitalism generally (Nitzan and Bichler, 2006, 2009; Bichler and Nitzan, 2012, 2021), but also – and even more importantly (for the purposes of this thesis) – as integral driver of, and key dynamic within, EDCs specifically.

By confining analyses of EDCs' power relations to an apparently 'extra-economic' sphere where cost-shifting and appropriation are bracketed, *Marxist explanations* struggle to apprehend the wider spectrum of power relations/dynamics that cannot be straightforwardly explained using these two key concepts. To be clear. I am not arguing that *Marxist explanations* illuminate power in the 'extra-economic' realm while ignoring power in the 'economic' domain. But rather, in a contemporary capitalist reality where power arguably drives and pervades *all* accumulation, it is doubtful whether these two realms can meaningfully be said to exist in the first place; a key corollary being to undermine *Marxist explanations*' ability to adequately capture this power-plethoric reality in the context of EDC (Nitzan and Bichler, 2006, 2009; Bichler and Nitzan, 2012, 2021). At the crux of the issue lies the question of how to conceptualise capital(ism) and capital accumulation, and the analytical role of power *within that conceptualisation*. Moreover, an important corollary of this failure to fully elucidate capitalist power in EDCs is a concomitant paucity of analysis regarding the extent and nature of capitalist vulnerability in this context. However, these arguments bear directly on the following imperatives (previously outlined in Section 2.3), which this thesis broadly shares with the Barcelona School of PE:

- Critiquing capitalism and its insatiable metabolism, while exploring the conditions and potential for socio-ecological transformation through alternatives (Kallis cited in Demaria, 2017: 29).
- Engagement with a diverse range of theories 'to explain conflicts, and empower political alternatives' (ibid.).

A prerequisite for critique is understanding. Thus, any weaknesses in extant theorisations of contemporary capital(ism), accumulation, and the role of power therein are liable to generate flawed understandings and critiques. If unaddressed,

then, *Marxist explanations'* flawed understandings/critiques of the capital(ism)-power dialectic could unintentionally hinder efforts to catalyse the socio-ecological transformations that are urgently required. Similarly, these flawed understandings/critiques also risk undermining *Marxist explanations'* efforts 'to explain conflicts, and empower political alternatives' (Kallis cited in Demaria, 2017: 29). Indeed, as David Harvey (2018: 149) has argued: 'While our task may be to change the world, it is a prerequisite for revolutionary theory that we first understand it'.

If Marxist theories of capital are unable to elucidate the role of power in twenty-first century accumulation and the EDCs and fracking conflicts that result from the pursuit of such accumulation, then where does this leave us? For those who are sympathetic to Marx's political project, it is understandable why many would be reticent to stray too far from the gravitational pull of 'planet-Marxism', lest one be left adrift 'with no other home for a critique of capital accumulation' (McMahon, 2022: 43). As Nitzan and Bichler (2009) have argued, as critics of capitalism, the extent of our intellectual debt to Marx cannot be overstated:

> The very concept of the 'capitalist system'; the view of capital as a political institution and of political critique as part of the class struggle; the emphasis on the ruling class and the socio-historical context in which it emerges; the dialectical development of history in general and of capital accumulation in particular; the imperative of empirical research; the universalizing tendencies of capital – these ideas and emphases are all due to Marx…His insights, along with the debates among his followers and critics, are deeply embedded in our current thinking (ibid.: 84).

However, there is no reason why we cannot embrace these (and other) valuable contributions while simultaneously questioning Marx's overarching theory of capital. If we did decide to look beyond Marxism in our quest to better understand the political economic drivers and dynamics of EDC (and the centrality of multidimensional capitalist power), how should we proceed? This question will be addressed in the forthcoming chapter. However, before tackling this question, it is necessary to briefly explore the fracking conflict literature: the other stand of literature to which this thesis seeks to make a contribution.

2.5 Fracking conflict

Although there are multiple references to fracking conflict in the EDC literature, as far as I am aware, very few (if any) studies in this literature explore fracking conflict in depth. Thus, these references typically highlight fracking as an activity that is increasingly generating EDCs while identifying real world examples documented in the EJAtlas. However, like the broader EDC literature, while offering useful insights, such studies struggle to illuminate how the full spectrum of capitalist power is implicated in fracking conflicts; both as fundamental driver of and key dynamic within such conflicts (e.g. Scheidel et al., 2018; Martinez-Alier, 2022).

Beyond the EDC literature, there is a sizeable and growing social scientific literature on fracking conflict. Although much of this literature does not explicitly seek to explain the drivers of fracking conflict (at least not in those specific terms), it does nevertheless contain valuable insights on this topic. These insights tend to relate to the immediate concerns of those involved in fracking conflict. For example, common drivers of fracking conflict identified within this literature include concerns regarding: the negative environmental and human health impacts of fracking, both local and global (e.g. Willow and Wylie, 2014; Cotton, 2015; Nyberg et al., 2018); injustices and exclusions surrounding the politics and governance of fracking (e.g. Evensen, 2018; Szolucha, 2018; Short and Szolucha, 2019); and disruptions to communities' sense(s) of place resulting from fracking (e.g. Sangaramoorthy et al., 2016; Lloveras et al., 2021; Mando, 2021). However, while the insights provided by these studies are both interesting and useful, their ability to elucidate the more fundamental capitalist political economic/ecological drivers on fracking conflict are limited.

With notable exceptions (e.g. Russell, 2013; Brock, 2020), amongst the handful of studies within this literature that do seek to illuminate fracking conflict's more fundamental drivers, most - much like the EDC literature - tend to draw upon broadly Marxist understandings of capital (e.g. Delgado, 2018; Hadad et al., 2010; Vandervoode, 2022). However, as per the EDC literature, while Marxist approaches offer useful insights, the conceptual foundations of Marxist political economy limit

their ability to fully illuminate the full spectrum of capitalist power as fundamental driver of, and key dynamic within, fracking conflict.

2.6 Chapter summary

Primarily addressing the EDC literature, an activist orientated literature at the intersection of EE and PE, this chapter has critically explored two common types of explanation for the global proliferation of EDCs: *SMGACEs* and *Marxist explanations*. Despite their numerous analytical insights, both types of explanation contain several assumptions and/or blind spots that hamper their ability to: (a) elucidate the full spectrum of capitalist power and vulnerability in twenty-first century capital accumulation; and (b) their central roles in the global proliferation – and dynamics – of EDCs. Having reviewed the EDC literature in depth, this chapter then turned its attention to the fracking conflict literature; the second area of academic literature to which this thesis seeks to contribute. Although more cursory in scope, this subsequent review identified important parallels between the fracking conflict literature and its EDC counterpart; especially regarding those studies that seek to elucidate conflicts through a Marxian lens.

Chapter 3: Capital as power and carbon capitalism: towards an alternative framework for explaining ecological distribution (and fracking) conflicts

In this Chapter, I will explore Nitzan and Bichler's (2009) ground-breaking capital as power approach (Section 3.1) before considering Di Muzio's (2015) writings on carbon capitalism and other recent attempts to elucidate the energetic underpinnings of capitalist power (Section 3.2). In doing so, I will pay particular attention to those aspects that could usefully illuminate theoretical-empirical explorations of capitalist power and vulnerability in the context of EDC and fracking conflicts. Synthesising the above with existing insights from the EDC literature, I then present an alternative framework to guide such explorations (Section 3.3). In addition to expanding extant understandings of the fundamental drivers and dynamics of EDCs in general and fracking conflict in particular, this framework is intended to help would be land defenders and environmental justice activists to thwart environmental injustices, thus supporting efforts to build a more just and sustainable global order.

3.1 Capital as power (CasP)

Following Nitzan and Bichler (2009), rather than a mode of production or consumption, capitalism can be more usefully conceptualised as a mode of power. As such, capital is not a material-productive entity, but rather a symbolic representation – expressed quantitively in monetary units (e.g. dollars, pounds, yen etc.) – of 'organised power at large' (Bichler and Nitzan, 2020a: 14). In this way, capital is an *entirely* financial phenomenon whose quantities express (dominant) capitalists' power to organise, shape, and transform social reproduction for pecuniary gain (Nitzan and Bichler, 2009). According to this conceptualisation of the accumulatory struggle, power serves both as means and end, with (dominant) capitalists deploying their power strategically for the purposes of augmenting it (Cochrane, 2015; Nitzan and Bichler, 2009). These bold contentions sit at the heart of the CasP approach to political economy; a radically novel theory of capital(ism) whose genesis can be traced to the pioneering collaborations of Shimshon Bichler and Jonathan Nitzan (e.g. Bichler and

Nitzan, 2004, 2012, 2016a, 2021; Nitzan and Bichler, 2000, 2002, 2009).[21] From this perspective, then, capital accumulation, socio-metabolic growth/changes (or the shifting terrain of social reproduction in the language of CasP), and resulting *EDCs are ultimately driven by (dominant) capitalists' quest to increase their power.*[22]

Although the most detailed articulation of CasP can be found in Nitzan and Bichler's 2009 book, *Capital as Power: A Study of Order and Creorder* (Nitzan and Bichler, 2009), many of its key ideas, concepts, and methodological innovations were developed in earlier works (e.g. Bichler and Nitzan 1996; Nitzan and Bichler, 1995, 2000, 2002).[23] However, only relatively recently have other researchers begun to deploy the CasP framework in their own research (e.g. Park, 2013; Baines, 2015; Cochrane, 2015; Fix, 2015; McMahon, 2015).

As noted by Hager (2013: 72), CasP 'brings together a diverse set of radically-minded researchers interested in exploring the possibilities and limitations of the concept of power as an alternative basis for re-thinking and re-searching political economy'. While this small but growing research community was initially most active in and around York University, it has since expanded beyond this location. Most notably perhaps, the CasP community now has its own transnational platform in the form of capitalaspower.com, described by Bichler and Nitzan (2015: 14) as 'a virtual locus for open dialogue between people interested in and engaged with the concept of capital as power'.

As argued above, CasP challenges dominant political economic approaches, both liberal and Marxist. However, following Hager (2013: 72-73), it could be argued that CasP 'does not [itself] form a coherent theoretical "school" or a "paradigm" in the

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[21] The majority of Bichler and Nitzan's writings can be downloaded open-access at: https://bnarchives.yorku.ca/

[22] While this argument, and the general relevance of CasP to EDC, will be unpacked in more detail shortly, I introduce it here to underline its key importance.

[23] This book can be freely accessed at: https://bnarchives.yorku.ca/259/2/20090522_nb_casp_full_indexed.pdf

Kuhnian sense of taking for granted fundamental concepts and placing strict limitations on the aspects of social life that are to be researched'. Rather, CasP's chief impetus is theoretical-empirical investigation into the ever-shifting realities of capitalist power (ibid.). The CasP approach has been deployed to research a wide variety of phenomena including stagflation in Israel (e.g. Nitzan and Bichler, 2002) and the United Sates (e.g. Nitzan and Bichler, 2009), wars in the Middle East (e.g. Nitzan and Bichler, 2006), the 2008 financial crisis (Bichler and Nitzan, 2013), mergers and acquisitions, and the increasing globalisation of capital (e.g. Nitzan and Bichler, 2009). Meanwhile, a new generation of CasP scholars have explored the political economy of public debt ownership in the US (Hager, 2016), the historical accumulation of the De Beers mining cartel in South Africa (Cochrane, 2015), the relationship between hierarchy and energy use (Fix, 2015), distributional struggles in the global food regime (Baines, 2013), and the accumulation strategies of Hollywood film corporations (McMahon, 2022).

3.1.1 Key influences

To pave the way for my forthcoming exploration of how Nitzan and Bichler's (e.g. 2009) CasP approach can elucidate the relationship between capitalist power and EDCs, it may be useful to consider some of the key influences on their work. While some of the ideas and concepts introduced in this sub-section may seem somewhat abstract on first reading, their relevance should become clearer in subsequent sections where the links between CasP and EDCs will be discussed more explicitly.

In developing their novel approach, Nitzan and Bichler draw on numerous thinkers. However, following Baines (2015), four individuals stand out as especially important influences on the development of Nitzan and Bichler's political economic thought: namely, 'Karl Marx, Cornelius Castoriadis, Thorstein Veblen and Michal Kalecki' (Baines, 2015: 4).[24] Turning firstly to Marx. Despite their many criticisms of Marx's theory of capital, Nitzan and Bichler (2009) acknowledge a large intellectual debt to

[24] The arguments in this sub-section draw heavily on Baines' (2015: 4-7) insightful synthesis of the key influences on Nitzan and Bichler's (2009) CasP approach.

capitalism's arch nemesis. Indeed, Nitzan and Bichler's work has been strongly influenced by Marx's 'general approach', especially his conceptualisation of capitalism as capital's political regime (Nitzan and Bichler, 2009). As Baines (2015) notes, Nitzan and Bichler also take from Marx the crucial understanding that while accumulation processes are intrinsically antagonistic, these processes simultaneously engender a broader macro-societal power structure with universalising tendencies. However, Nitzan and Bichler also depart from Marx in fundamental ways. Thus, while the latter's theory of capital is largely derived from a 'bottom-up' perspective that analytically prioritises labour and production, Nitzan and Bichler's 'top-down' perspective – which tries to understand capitalism from the vantagepoint of what they term 'dominant capital' (defined as the preeminent government-corporate coalitions at the centre of the accumulatory process) – yields quite a different understanding (Baines, 2015; Nitzan and Bichler, 2009). Thus, while labour is still important within Nitzan and Bichler's framework, it represents one amongst a myriad of factors to be accounted for in their 'disaggregate analysis of the whole gamut of social relationships that may bear on the earnings capacity of business' (Baines, 2015: 4).

Second, Baines (2015) considers Cornelius Castoriadis' (1984) influence on Nitzan and Bichler's framework (2009). In doing so, he notes a key contribution from Castoriadis that identifies a fundamental contradiction in Marx's work: namely, between Marx's incisive dialectical analysis of capitalism's conflict-ridden historical development; and his desire to mimic contemporaneous developments in chemistry and physics by identifying capital's fundamental basic units, alongside its enduring 'laws of motion' (Baines, 2015: 4). While Nitzan and Bichler are very critical of this latter approach, they broadly endorse the former; especially Marx's emphasis on conflict and its transformative dynamics (ibid.). While rejecting Marx's search for capital's basic units, Nitzan and Bichler (2009) endorse Castoriadis' (1984) argument that capital has no objective-material essence. On the contrary, capital and its quantities are a social product of 'the nomos'; with the latter term (borrowed from Aristotle) denoting 'the…social–legal–historical institutions of society' (Nitzan and Bichler, 2009: 149). Drawing on this key insight, Nitzan and Bichler argue that political economists must be

prepared to explore all the diverse power relations that influence the valuation of assets and commodities. Thus, capitalism's constantly fluctuating price and income ratios cannot be explained in terms of anything inherent to the commodities/assets being traded (whether neoclassical 'utils' or Marxists' 'social necessary abstract labour time'). Rather, these fluctuating ratios can be better understood as quantitative expressions of the myriad conflicts that shape and re-shape global patterns of social reproduction and the capitalist nomos more broadly (Baines, 2015; Castoriadis 1984; Nitzan and Bichler 2009).

Third, for Baines (2015: 5), this double shift of emphasis by CasP – 'from the material to the social, and from the exploitation of labour to the totality of power' – is also illustrative of Veblen's (1904) enduring influence on Nitzan and Bichler's (2009) work. In contrast to Marx, whose theory of capital is derived from materialist explorations of capitalist production, Veblen's (1904) starting point is 'the state of the industrial arts' (Baines, 2015: 5): that is, the immaterial assets – bequeathed by previous generations – required for the production of goods and services deemed 'socially useful' (ibid). These immaterial assets comprise all the historically accumulated knowledge that make any particular form of production possible. For example, while the research and development processes of the information technology sector depend on knowledge associated with the field of information technology, they simultaneously incorporate myriad insights from a diversity of fields such as chemistry, mathematics, physics, biology, engineering, politics, economics, sociology, and demography (Nitzan and Bichler, 2009). The technological development that comprises 'the state of the industrial arts' is both context-specific and historically contingent (Baines, 2015). For example, the computer could never have been invented in ancient Rome. For the accumulated historical knowledge available to ancient Romans was not at a stage where this would have been either possible or useful. Such technological development also depends on the ability to integrate countless information streams while synchronising multiple industrial processes (e.g. computer production involves industrial sub-processes such as the production of plastics, glass, electric cables, circuit boards etc.) (ibid.). However, Veblen draws a clear distinction between the

cooperation required for the cumulative development of technological knowhow with the pecuniary imperatives of business (ibid.). On this basis, he also conceptualises 'business' and 'industry' as separate domains with the former controlling, directing, and frequently sabotaging the latter for pecuniary ends. As Baines (2015: 6) explains, a key Veblenian insight concerns the way business

> strategically inserts itself at the interstices of the multiple sub-processes of industry, so as to exact tribute from the community in the form of profit, in return for granting the community access to privately-controlled, but collectively-created, productive capacity.

For Veblen, the amount of tribute exacted by business is intimately tied to owners' relative bargaining power vis-à-vis the wider community; with the latter being strongly influenced by determinants such as the asset's relative importance, substitutability, and the methods through which it is managed (ibid.). For example, as I write this (in April 2023), there is growing public anger at energy company profiteering, whose counterpart can be found in the increasing numbers of people experiencing (fuel) poverty. Here, we find a relatively small number of large firms controlling access to the energy services (principally derived from oil and gas) that most people still rely on for their heating and mobility needs (Mahmood, 2023; Jolly and Elgot, 2022). However, whereas Veblen's work hints at the importance of studying the distributional dynamics and implications of changing relative prices, Nitzan and Bichler put these dynamics front and centre of their own analysis (Baines, 2015). Thus, while their CasP approach is strongly influenced by Veblen's insights, it also reworks them significantly to produce 'a systematic *power theory of value*, based on new categories and new research methods' (ibid.: 6).

Fourth, CasP's methodological toolkit has been strongly influenced by Michal Kalecki, a neo-Marxist political economist who developed a tentative distributional indicator of capitalist control (Baines, 2015). Kalecki's 'the degree of monopoly' measure, comprising the relative profit margins garnered by monopolistic corporations, constitutes a (quantitative) proxy to gauge market power (ibid.). Through this concept, Kalecki alludes towards an understanding of income redistribution as being more than just a product of shifting market power; but rather, the latter's very definition (ibid.).

However, while this measure is important, it only concerns the narrowly 'economic' questions of competition and monopoly. Accordingly, Nitzan and Bichler have developed several additional quantitative measures to elucidate the shifting distributions of power resulting from capitalist efforts to reshape the terrain of social reproduction at large (ibid.).

As Baines (2015) notes, it is through these methodological developments that Nitzan and Bichler articulate explicitly what remains largely implied in both Veblen and Kalecki's work (ibid.). In doing so, they arrive at their central thesis: namely, that the qualitative development of capitalism's institutions and the quantitative fluctuations in its structure of prices are intrinsically linked, forming two integral aspects of the same fundamental power process (ibid.). From this perspective, capital's quantities (and the price system more generally) are conceptualised as quantitative expressions of power over society and nature; with change or stasis in the later expressing qualitative shifts in conflict and cooperation, both within and between different organisations/groups (ibid.). Consequently, Nitzan and Bichler eschew 'dual quantity' understandings of capital (e.g. neoclassical and Marxist) that theorise the nominal quantities of earnings and prices as somehow tied to fundamental but unobservable quantities in the realms of production and consumption (ibid.). Rather, as the sole quantitative sphere available to us, the nominal sphere is the only one that matters. Consequently, CasP seeks to explain the quantitative fluctuations in earnings and prices in terms of the qualitative changes of society's institutions, to produce 'a "scientific story" of capitalist power' (Nitzan and Bichler, 2009: 313; Baines, 2015). In doing so, CasP represents a radical departure from existing political economic approaches; both liberal and heterodox. The implications of these arguments for EDC research/scholarship will be unpacked in more detail shortly. However, one seemingly important implication of the above is that (qualitative) power struggles over contested socio-metabolic (re)configurations (e.g. Scheidel et al., 2018) are likely to be expressed in the financial quantities of capital. If so, this suggests interesting possibilities for EDC researchers to explore: (a) how these qualitative socio-metabolic power struggles are translated into the financial quantities of capital; and (b), how such information might be useful for

the climate/environmental justice activists seeking to disrupt capitalist power for the purposes of building a more just and sustainable global order (e.g. Temper et al., 2018a).

Reflecting on CasP's project of analysing capitalism's financial quantities through the lens of power, Baines (2015) – following Nitzan and Bichler (2009) – highlights several key methodological implications that follow from this project. Firstly, the inherent relationality of power implies that both prices and accumulation must be comprehended in differential terms (ibid.). Within real-world capitalist praxis, this differential impulse can be discerned from the way large corporations – rather than seeking absolute accumulation – endeavour 'to beat some average benchmark' (ibid.: 7). In this regard, capitalists judge '*their own performance by comparing it to the performance of others*' (Nitzan and Bichler, 2009: 309); a quest who's primary

> goal is not to maximize but to exceed, not to meet but to beat. To achieve a 5 per-cent profit growth during recession is success; to gain 15 per cent when others make 30 is failure. Even declining profit can be a triumph, provided it 'outperforms' the average (ibid.).

The second methodological implication Baines (2015) takes from Nitzan and Bichler's work concerns the inherent dynamism of power. Thus, in contrast with the neoclassical/liberal tendency to conceptualise markets around notions of static equilibria, CasP theorises accumulation as an inherently conflictual process (ibid.). Consequently, this novel framework encourages methodologies that elucidate 'how one group's ongoing attempts to restructure social reproduction encounters ever-changing resistance from other social groups' (ibid.: 7). Consequently, the differential/relative nature of accumulation means that intra-capitalist conflict is just as important as conflict between capitalists and non-capitalists. Thus, there is no capital in general, but rather the relentless (re)formation of competing capitalist coalitions whose alliances are constantly changing (Baines, 2015; Nitzan and Bichler, 2009). This latter point could have particularly significant implications for the way we theorise and study EDCs. It also relates directly to the final methodological lesson

Baines (2015) draws from Nitzan and Bichler. As he argues, accounting for the inherent relationality and dynamism or power described above,

> Nitzan and Bichler suggest that rather than engaging in case-studies of individual firms or aggregate analysis of the corporate sector as a whole, we should delineate and disaggregate the performance of the contending coalitions within what they call 'dominant capital': the major corporations which operate in tandem with, and are often intertwined with, key government organs in restructuring social reproduction for differential pecuniary gain (ibid.: 7-8).

To the best of my knowledge, the CasP approach has yet to be applied within the specific context of EDC research/scholarship. However, given CasP's wider interest in the relationship between capitalism's fluctuating price/income ratios and the myriad conflicts that shape and re-shape the terrain of social reproduction, the potential for dialogue with EDC debates is apparent; especially considering the latter's cognate concern for the social-reproductive implications of EDCs (e.g. Akbalut et al., 2019). Thus, having provided a general overview of the CasP framework and some of its key intellectual influences, I will now explore this novel approach in more detail, focusing especially on those aspects that will be most enlightening for the theoretical-empirical investigation of a real-world EDC presented in Chapter 5. In doing so, I argue CasP offers promising opportunities for illuminating: (a) the driving role of capitalist power in the global proliferation of EDCs; and (b) how capitalist power might be successfully countered for the purposes of catalysing the 'radical transformations to sustainability' that are urgently required (Temper et al., 2018a: 1).

3.1.2 Ownership, power and sabotage

While the CasP framework acknowledges the importance of capital-labour relations, it subsumes these within a broader set of conflictual relations. Here, the principal class divide is between a relatively small class of 'absentee owners of pecuniary wealth' and a much larger class of non-owners (Nitzan and Bichler, 2009: 230). This wider analytical focus illuminates how the power of (dominant) capital groups is not just related to the subordination of labour during the working day. But rather, insofar as (dominant) capitalists are driven to augment their power by constantly (re)shaping social

reproduction (and the social metabolism), this power impacts directly and forcefully on non-capitalists/non-owners' entire lives (Di Muzio, 2014a). This latter point is illustrated by the way (dominant) capitalists' efforts to reshape social reproduction and social metabolism(s) frequently give rise to EDCs. Thus, CasP's emphasis on the conflictual hierarchical relations between non-owners and owners; and their social reproductive implications aligns with existing EDC research/scholarship and its focus on 'the contradiction between capitalist accumulation vs. conditions of social reproduction (rather than that between capital and labour)' (Akbulut, 2019: 1).

However, as noted previously, the conflictual/differential nature of accumulation means that intra-capitalist conflict - between competing coalitions of owners - is just as central a feature of capitalism as conflict between owners and non-owners (Nitzan and Bichler, 2009). Thus, while capitalist ownership includes the means of production, it also comprises a much wider array of assets (Nitzan and Bichler, 2009; Cochrane and Monaghan, 2014a); with the latter consisting of 'anything that can be privately owned' (Hager, 2013: 76). When (dominant) capital groups struggle to (re)shape the terrain of social reproduction (and the social metabolism) in their image, they do so for the purposes of increasing their relative power measured by the *differential* value of the capitalised income-generating assets over which they hold ownership titles. According to Nitzan and Bichler (2009), it is the relative values of these ownership titles that enable (dominant) capitalists to assess their own power relative to their peers.[25]

However, because capitalist power is based on ownership (and the right to exclude non-owners), Nitzan and Bichler (2009) argue that capital is not a material-productive entity. To illustrate the non-productive character of contemporary capital, Nitzan and Bichler (2009) draw attention to the meteoric rise of absentee ownership and its role in widening the separation between 'business' (driven by the logic of pecuniary gain) and 'industry' (whose logic, in its purest form, seeks the open-ended goal of improving

[25] I will explore this argument in more detail in Section 3.1.4.

human wellbeing as efficiently as possible).[26] As Nitzan and Bichler (2009: 230-231) explain,

> (c)urrently, roughly half of all capitalist assets are owned indirectly through institutional investors such as pension and mutual funds, hedge and sovereign funds, insurance companies, banks and corporations. The ultimate owners of these assets, whether big or small, exercise little voice in the management of the underlying production processes. For the most part, they merely buy and sell shares of these assets and collect the flow of dividends. Often, their diversification is so extensive that they don't know exactly what they own (ibid.: 231).

However, as Nitzan and Bichler emphasise, this characterisation does not just apply to portfolio investors. On the contrary, they argue, even many of the largest capitalist direct investors are similarly removed from the industrial sphere; with most of their efforts concentrated 'on the high politics of sabotage and the fine art of cutting and pasting assets through endless deals of divestment and merger' (ibid.).

Veblen's (1904) concept of 'sabotage' concerns the strategic incapacitation/restriction of human creativity and production for the purposes of business profit (Di Muzio, 2014b). This concept is founded upon the insight that capital, rather than having a material-economic basis, is solely a financial magnitude; with the latter depending not on the ability to produce, but the power to incapacitate (Nitzan and Bichler, 2009). However, Bichler and Nitzan (2017: 3) expand this concept to encompass all (dominant) capital's efforts to 'restrict, limit and inhibit the autonomy of those with less or no power' – capitalist or otherwise – during the course of their accumulatory struggles. Since its inception, CasP scholarship has identified countless examples of dominant capital engaging in strategic sabotage for the purposes of differential accumulation.[27] These include: inflationary price increases that redistribute income

[26] In making this argument, Nitzan and Bichler (2009: 235) emphasise how 'the line separating the socially desirable and productive from the undesirable and counterproductive is inter-subjective and contestable'. Nevertheless, this does not detract from their argument that 'a significant proportion of business-driven "growth" is wasteful if not destructive, and that the sabotage underlying these socially negative trajectories is exactly what makes them so profitable' (ibid.).

[27] The following examples of strategic sabotage are cited in Bichler and Nitzan (2017). For more examples, please refer to this source.

upwards to dominant capital while undermining the general population's security and living standards (e.g. Nitzan and Bichler, 2009); expanding arms sales and militarisation that stoke violent conflict whilst redistributing income to the largest armament firms (e.g. Nitzan and Bichler 2002); increasing food-price volatility and food-price spikes that precipitate widespread hunger and social unrest in the Global South whilst driving up the differential profits of the world's most dominant grain producers and preeminent commodity trading firms (e.g. Baines, 2017); the global expansion of junk foods that fuel ill health whilst driving up the differential profits of the leading pharmaceutical and food corporations (e.g. Bichler and Nitzan, 2016b); the capitalisation of government debt by the wealthiest individuals and corporations to the detriment of the wider population (e.g. Hager, 2016). With these examples in mind, the violence, cost-shifting, appropriation, and ecological degradation that invariably precipitate EDCs could also be viewed through the lens of strategic sabotage.

Regardless of context, all forms of sabotage are ultimately driven by the conflictual/differential logic of accumulation and the strategic imperative to 'boost one's own earnings and capitalisation relative to – and often by undermining – those of others' (Bichler and Nitzan, 2017: 7). Within CasP scholarship, dominant capital – the largest corporate-government coalitions at the centre of the accumulatory process – are regarded as the most successful saboteurs.[28] As noted by Di Muzio (2013: online),

> while certain small business owners may have some power to sabotage the potential of human creativity, this power is likely minimal in comparison to the giant saboteurs like Microsoft, Apple, Exxon Mobil and other highly capitalized companies.

Here, Di Muzio is drawing on Nitzan and Bichler's (2009) argument that the power to inflict sabotage is expressed decisively in the financial quantities of capital; especially those pertaining to capitalisation. It is to the latter that we now turn.

[28] Building on Nitzan and Bichler (2009), Di Muzio (2015), refers to those individuals with the largest ownership claims over dominant capital as 'dominant owners'.

3.1.3 Capitalisation

Since its emergence in fourteenth century Italy, capitalisation has developed and proliferated to such an extent that it arguably now represents the capitalist nomos' most dominant financial convention (Nitzan and Bichler, 2009). Capitalisation, which Bichler and Nitzan (2010: 1) have described as capitalism's 'universal financial ritual', is a forward-looking calculative process whereby an owned income-generating asset (e.g. government bonds, corporate shares, a property portfolio, intellectual property right, or anything else that can be owned and monetised) is valued/priced by capitalists, investors, and other market participants. This valuation process involves a future earnings stream – derived from the owned income-generating asset in question – being discounted into a present price/value adjusted by some risk factor (Nitzan and Bichler, 2009). For those unfamiliar with these concepts (and the language of finance more generally), this definition requires some unpacking. The capitalisation ritual is underpinned by the notion – associated with capitalist/investor praxis and the (financial) time value theory of money – that any currency unit (e.g. a dollar, pound, euro etc.) is more valuable now than it will be tomorrow or any subsequent day. This is because it can begin yielding interest immediately (Di Muzio and Dow, 2017). Consequently, the future, which is inherently uncertain, is discounted into a present price/value by investors; with the chosen discount rate being heavily influenced by investors' risk perceptions regarding the asset/flow of future earnings in question. Thus, when investors are confident their future earnings expectations will be realised, the discount rate will be lower. This results in a higher present value for the capitalised asset/future earnings in question. However, when investors are less confident in their future earnings predictions the discount rate will be higher and the asset/future earnings will be capitalised at a lower present value (Nitzan and Bichler, 2009, 2015; Di Muzio, 2015; Cochrane, 2015). On this basis, Di Muzio (2015) notes how one of the key questions posed by CasP is to ask what exactly investors are capitalising when they buy ownership claims over income-generating assets. The 'simple answer', which Di Muzio argues any informed investor would confirm, is that they 'are capitalizing expected future earnings' (ibid.: 32). For publicly traded corporations (whose shares/stocks are

listed and traded on the world's stock exchanges), their capitalisation – frequently referred to as market value – is computed by taking the current share price and multiplying it by the total number of outstanding shares. For instance, if Google has 7.45 billion shares outstanding and one share is currently being traded at $US280, their current capitalisation is $US2.1 trillion (Di Muzio, 2014b). However, much like any other income-generating asset, the owners of Microsoft's shares are capitalising the firms' ability to generate future earnings (Nitzan and Bichler, 2009; Di Muzio, 2014b).

Thus, while capitalists frequently rely on a range of metrics to analyse their accumulatory success or failure, capitalisation remains the preeminent yardstick and ordering mechanism of the capitalist nomos. As Cochrane explains

> (c)apitalization is used by banks when they issue loans. Capitalization is the basis for takeover valuations. Capitalization is on display when CNBC runs a ticker along the bottom of the screen during daytime programming. Capitalization is inhered in the major indexes whose milestones are reported as news. The New York Stock Exchange, the preeminent hub for the pricing of capital, itself earned $365 million (U.S.) in 2012 and sold that year for $8 billion (U.S.). Regardless of the valuation model an investor chooses it must be actualized through capitalization (Cochrane, 2015: 68).

Nitzan and Bichler (2009) decompose capitalisation into 'four elementary particles'. These elementary particles are future earnings, hype, risk, and the 'normal' rate of return (Nitzan and Bichler, 2009: 327). I will now explore each of these elementary particles – and their relationship to one another – before reflecting on their implications for EDC.

Elementary particle 1: Future earnings

Previously, I explored how capitalist earnings (and accumulation) are intimately linked with capitalist power and sabotage. When it comes to capitalisation, the evidence suggests that, over the long run of decades, earnings are its most important determinant. Nitzan and Bichler (2009) illustrate this by comparing the average share price against the average earnings per share for the firms comprising the S&P 500 group between 1871 and 2006, identifying a strong and positive correlation between

the two ('0.94 out of a maximum value of 1') (ibid.: 186).[29] While some might object that this correlation concerns actual profits (not the expected future profits discounted by investors), Nitzan and Bichler argue that such objections are unwarranted (ibid.). This is because capitalists employ current earnings (which are known) as a yardstick for extrapolating future ones (which are unknown); before 'quickly discount[ing] their guess back to its "present" value' (ibid.: 187). Regardless of their temporal pattern, such discounting involves a flow of future earnings being calculated into the infinite future as a fixed average (ibid.). With this in mind, Nitzan and Bichler note how, when that average is equalised to current profit (or a multiple thereof), this produces a convincing empirical result that highlights one of the contemporary capitalist nomos' key tenets (ibid.). Namely, that 'the level and growth of earnings – at least for larger clusters of capital over an extended period of time – are the main benchmark of capitalization and the principal driver of accumulation' (ibid.).

However, Nitzan and Bichler also present convincing evidence that earnings are not the only driver of capitalisation. Most notably, they identify periods – 'for instance, during the 1910s, 1940s and 1990s' – when the relationship between stock prices and earnings was relatively lax and sometimes negative (ibid.). Moreover, even when moving in the same overall direction, the level of variation between earnings and stock prices is frequently markedly different (ibid.). Furthermore, these deviations have tended to persist for significant periods, with price exceeding earnings for ten years or longer, before changing direction to lag earnings for a further protracted period (ibid.). Lastly, while this short-medium term divergence between capitalisation and earnings is readily apparent for the S&P 500, at the firm or sectoral level this tendency is significantly amplified (ibid.). Thus, it is not uncommon for individual firms and even whole sectors' capitalisation and earnings to diverge significantly for protracted

[29] The S&P 500 comprises the 500 largest firms by market capitalisation listed on the US stock exchange. Within CasP scholarship, the S&P 500 index is typically used to benchmark the differential accumulation of dominant capital (Nitzan and Bichler, 2009).

periods (ibid.). All of which strongly suggests that, beyond earnings, capitalisation is also influenced by other important factors (ibid.).

Elementary particle 2: Hype

Nitzan and Bichler (2009: 189) argue that to understand the relationship between capitalisation and (future) earnings two earnings-linked factors are key. The first of these factors is the *ex post* actual future earnings (ibid.). Although these earnings cannot be known at the time of capitalisation, this situation changes with the passage of time as income is announced and recorded (ibid.). The second key factor – which Nitzan and Bichler refer to as 'the hype coefficient' – concerns capitalists' *ex post* collective mis-valuation of the asset (ibid.). While this collective error is also unknown at the time of capitalisation, it too becomes known once the actual earnings are announced (ibid.). Nitzan and Bichler's hype coefficient gauges the extent of capitalist over-pessimism/over-optimism regarding future earnings (ibid.). As outlined above, at high levels of aggregation (e.g. the S&P 500) and over the decades, hype does not appear to play a significant role in capitalisation. In these contexts, then, the simplifying assumptions that a flow of earnings will persist at current levels long into the future; and that investors' expectations viz a viz those earnings are neither overly pessimistic nor overly optimistic work relatively well. However, in the short run and/or applied at the firm or sectoral level, these assumptions start to break down, opening the door for analyses that explore the hype-power dialectic and its implications for capitalisation (ibid.).

As an entry point into above, Nitzan and Bichler ask us to consider a scenario where large and extended waves of hype are the norm (ibid.). In such a scenario, they argue, these hype waves would be critical for our comprehension of capitalism. Moreover, the larger these hype waves are in magnitude, the more they would amplify capitalisation's movements while generating wider political economic reverberations. Next, Nitzan and Bichler ponder an additional scenario where hype waves are not just large and protracted, but also rather systematic. Such a scenario, they argue, would

create opportunities for 'insiders' to manipulate hype, essentially enabling them 'to print their own money' (ibid.: 190-191).

So, who are these 'insiders'? Nitzan and Bichler identify two distinct types: 'passive' and 'active'. They describe the 'passive insider' as 'a capitalist who knows something about future earnings that other capitalists do not' (ibid.: 191). This might include a dominant Barclays investor who was tipped off about a forthcoming government-financed bailout of Northern Rock; or a Bupa executive who is close to signing a new multi-billion-pound contract with the NHS. With access to this kind of exclusive knowledge, passive insiders are uniquely positioned to gauge whether or not an asset is over- or under-hyped; giving them the confidence to purchase assets 'for which earning expectations fall short of 'true' earnings – and wait' (ibid.: 191). When the passive insider's privileged insight becomes common knowledge, the subsequent increase in pro-fras up the asset's price, making them richer in the process (ibid.).

For Nitzan and Bichler, these examples typify the 'largely *passive*' insider, who adopts a position in anticipation of a shift in hype (ibid.). Although less recognised than its passive counterpart, the 'active insider' is considerably more potent, they argue (ibid.). The 'active insider' can be distinguished by two specific characteristics. Firstly, while similarly adept at identifying hype, 'the active insider' – crucially – also knows 'how to *shape* its trajectory'. Secondly, this type of insider also tends to maneuver 'not individually, but in loosely organized pacts of capitalists, public officials, pundits and assorted "opinion makers"' (ibid.). Nitzan and Bichler illustrate this point with the example of the 'US sub-prime scam', which they argue

> was energized by a coalition of leading banks, buttressed by political retainers, eyes-wide-shut regulators, compliant rating agencies and a cheering chorus of honest-to-god analysts. The active insiders in the scheme leveraged their positions – and then stirred the capitalist imagination and frothed the hype to amplify their gains many times over (ibid.).

Moreover, this hype-power dialectic would seem to be a recurring – and highly potent – phenomenon within capitalism's historical geography. To illustrate this point, Nitzan and Bichler cite the recurring booms and busts associated with episodes such as the

Tulip Mania bubble (17th century), the South Sea and Mississippi schemes (18th century), the so-called '"new-economy" miracle (20th century), and the sub-prime crisis (21st century) (ibid.). For Nitzan and Bichler, these (and countless similar) episodes are hugely revealing. As they explain, such episodes

> will tell you how huge fortunes have been made and many more lost. They will teach you the various techniques of public opinion making, rumour campaigns, orchestrated promotion and Ponzi schemes. And they will introduce you to the leading private investors, corporate coalitions and government organs whose art of delusion has helped stir the greed and fear of capitalists, big and small (ibid.: 191-192).

However, in qualification to the above, Nitzan and Bichler note how – their many insights notwithstanding – these historical examples tell us nothing about hype's magnitude (ibid.: 192). In each of these historical examples, we know that investors were induced to expect asset values to rise (or fall). However, as Nitzan and Bichler emphasise, price and earnings are not the same, and in the absence of knowledge regarding capitalists' earnings projections, 'we remain ignorant of hype, even in retrospect' (ibid.).

Building on these insights, Di Liberto (2022) argues that capitalists recurrently reinforce their power over society by deploying hype strategically. Thus, beyond its key pecuniary function, hype, according to Di Liberto, also provides capitalists with a strategic tool that - by increasing public confidence in the prospect of future reward - enables them to counteract resistance (ibid). Synthesising Nitzan and Bichler's insights with those of Carlota Perez (2011), Di Liberto argues that throughout capitalism's history the most significant waves of 'systemic hype' have tended to be intimately connected with technological innovation. Within this analysis, 'systemic hype' is defined 'as the cyclical frenzy that accompanies the introduction of new products and technologies' (Di Liberto, 2022: 7). This systemic phenomenon, which Di Liberto describes as a 'form of novelty-driven hype', is driven by discourses that exaggerate "the revolutionary" nature of innovative technology' (Di Liberto, 2022: 7). Reflecting on the above arguments, it is notable that hype is barely mentioned in the EDC literature. Moreover, in the rare instances where the term does appear (e.g. Ariza-

Montobbio and Lele, 2010; Hanaček et al., 2022), the concept and its role in EDCs are not explored in any detail.

Elementary particles 3 and 4: risk; and the 'normal' (or 'risk-free') rate of return

To illustrate the significance of these two elementary particles, it may be helpful to (re)consider how: (a) capitalist asset ownership represents a claim on future earnings; and (b) asset prices, expressed in terms of present value, reflect how capitalists collectively assess those future earnings (ibid.). According to Nitzan and Bichler, these assessments are underpinned by two essential considerations: (1) the quantity of earnings capitalists expect to obtain; and (2) capitalists' degree of confidence that their earnings expectations will be met (ibid.). In different ways, the 'normal' rate of return and risk are both intimately linked to this degree of capitalist confidence. I will deal with each in turn.

The 'confident', 'normal', or 'risk-free' rate of return represents the minimum rate of return capitalists feel certain can be obtained (ibid.). While the 'normal' rate of return is not fixed and can vary over time, the more consequential point concerns the fact that such a 'rate exists in the first place' (Nitzan and Bichler, 2009: 243). Drawing on Nitzan and Bichler, McMahon (2022: 140) notes how perceptions of normality surrounding the 'risk-free' rate of return are intimately linked with the central role of state power – and the government bond – in rendering it 'a universal condition of business'. Because government bonds are broadly perceived as 'risk free', their interest rates are generally viewed as 'the lowest, or "normal", return on investment in the marketplace' (Di Muzio, 2015: 83). However, while capitalists frequently buy government debt, their preferred investment vehicles are those that generate returns over and above this 'normal' rate of return (ibid.).

However, as Nitzan and Bichler emphasise, these short-term state securities notwithstanding, the income of capitalists remains uncertain. Indeed, if things were otherwise, our previous discussion of hype would be redundant (ibid.). The dynamic and multifaced conflicts (e.g. EDCs) that both enable and stymie future earnings can develop in any number of directions. In some instances, when capitalist power is

relatively assured, capitalists can be more confident in their strategies and their ability to generate future earnings (ibid.). However, in less favourable contexts, when capitalist power is less secure, their forecasts will be more hesitant (ibid.). The extent of capitalist confidence/hesitancy is expressed through Nitzan and Bichler's risk coefficient. When capitalist confidence is at its highest possible level, the risk coefficient = 1. Alternatively, the risk coefficient is bigger than 1, and rises as confidence falls (ibid.). Crucially, as per the other elementary particles of capitalisation, the risk coefficient is intimately tied to institutional power and the conflictual dynamics of accumulation. As Nitzan and Bichler explain,

> (b)ig capitalists do not take the odds as given; they try to change them…They are not only risk takers, they are also risk shapers…For the large capitalists, reducing earning volatility is a major obsession…[By] shaping society, capitalist power 'translates' undefined uncertainty into seemingly quantitative risk. Capitalism is uncertain partly because the conflictual power logic of accumulation makes it so. But power also means ordering, and from the standpoint of capitalists this ordering is the degree to which they can contain their own uncertainty (ibid.: 210).

Reflecting on these arguments regarding the importance of 'risk', there would appear to be opportunities for dialogue between CasP and EDC debates. Indeed, the notion that accumulation is not guaranteed; and the related idea that EDCs and environmental justice campaigns pose a threat to capital accumulation both feature prominently in the EDC literature (e.g. Scheidel et al., 2018; Schindler and Demaria, 2020). However, notwithstanding their many insights, because these discussions are usually couched within a (broadly) Marxian understanding of accumulation, they are rarely framed explicitly in terms of 'risk' and forward-looking capitalisation. Consequently, there remains significant scope for exploring the potentially crucial interrelations between forward-looking capitalisation, risk, and EDCs.

3.1.4 Differential accumulation

Whether exerting their power to reduce risk, generate higher future earnings, or increase hype, capitalists do not seek to maximise their capitalisation in the abstract. Rather, because power is inherently relational – and capitalists can only judge their

performance (and power) relative to their peers – rather than capitalisation per se, what concerns capitalists more is their relative or *differential* capitalisation and, even more importantly, their differential accumulation (Nitzan and Bichler, 2009). I will deal with each of these key concepts in turn.

As Nitzan and Bichler (2009) argue, differential capitalisation represents a static measure (i.e. a snapshot in time) of a group of owners' differential power. This differential power can be gauged

> by comparing the group's combined capitalization to that of the average capital unit. If this average is $5 million, a capital worth $5 billion represents a DK [i.e. differential capitalization] of 1,000. This magnitude means that, as a group, the owners of that capital are 1,000 times more powerful than the owners of an average capital (ibid.: 313).

Differential capitalisation also enables static comparisons between different corporations (or corporate coalitions) to gauge their relative power (McMahon, 2022).

However, whilst interesting and instructive, differential capitalisation can only ever provide a static snapshot of capitalist power. Therefore, viewed from a more dynamic vantagepoint, it is far more illuminating to explore what Nitzan and Bichler (2009) term *differential accumulation*. Serving as a proxy for shifting differential power, differential accumulation gauges how differential capitalisation changes over time (ibid.). To accomplish differential accumulation, owners must therefore see their capitalisation increase faster than the average capitalisation; that is, relative to relevant financial benchmark (e.g. the Dow Jones Industrial Average or the S&P 500 index). Consequently, differential accumulation ratios that are negative, zero, or positive respectively signify falling, unchanging, or rising differential power (ibid.). Within CasP scholarship, the S&P 500 index (which comprises the 500 largest US-based equities by market capitalisation) is typically used to benchmark the differential accumulation of the biggest corporations; that is, those at the centre of the accumulatroy process who, alongside key government organs/institutions, comprise what Nitzan and Bichler (2009) term dominant capital.

However, as Nitzan and Bichler caution, the '"identity" [between differential accumulation and changing capitalist power] is only figurative' (Nitzan and Bichler, 2009: 312). Indeed, while this identity requires quality to be converted into quantity, and the translation and reduction of heterogeneous power processes 'into the universal units of differential capitalization', this process is far from objective (ibid.). Nitzan and Bichler identify two main reasons for this. Firstly, despite being readily apparent, capitalisation's relative magnitudes are rooted in 'the inter-subjective conventions of the capitalist nomos' (ibid.). Secondly, it is not possible to infer these relative magnitudes simply by studying the capitalist scene and its power relations (ibid.). As Nitzan and Bichler explain,

> (t)he fact that a certain corporation was granted a patent, that it had the government move to its side, that it introduced a new technique, or that it acquired a competitor, cannot, in and of itself, tell us much about that company's rate of differential accumulation (ibid.)

As such, this figurative identity can only be apprehended speculatively. Drawing on Hegel and Marcuse, Nitzan and Bichler argue that force can only be apprehended through its effects; with the latter always expressing some form of agreement between content and form, quality and quantity (ibid.). To more fully understand the power underpinnings of capital, then, it is necessary to explore the dynamic interrelation between its qualities and quantities. This can be achieved by simultaneously exploring the quantitative dynamics of differential accumulation and the qualitative power processes, institutions, and organisations underpinning such accumulation (ibid.) Of course, this methodology of moving from quantities to qualities cannot be undertaken with the level of precision or rigour associated with the natural sciences (ibid.). However, as Nitzan and Bichler note, the failure of liberal and Marxist attempts to replicate this rigour provides an important lesson in the pitfalls of such an approach (ibid.). As they explain,

> (c)apitalists constantly try to force life into a box, to harness creativity, to convert quality into quantity. This is the nature of their power. But they can achieve this conversion only speculatively and inter-subjectively, and there is no point in pretending otherwise. The task is to try to understand this speculative translation. And, in our opinion, the only way to do so is by telling a 'scientific story' – a systematic historical analysis that convincingly ties the quantities and qualities of capitalist power (ibid.)

So how are the multitudinous qualities of power translated into the quantities of differential accumulation? To answer this question, we must turn our attention once again to the elementary particles of capitalisation discussed previously (i.e. future earnings, risk, hype, and the 'normal' rate of return). Essentially, these four elementary particles also comprise the foundations of differential accumulation. However, because *differential* accumulation is calculated as the ratio between two entities (e.g. between a corporation/corporate coalition and a relevant benchmark) - the normal rate of return is effectively negated. This is because the 'normal' rate of return registers equally in both the entity in question's capitalisation *and* that of its comparator benchmark (Nitzan and Bichler, 2009; McMahon, 2022). Similarly, because differential accumulation is calculated as a ratio between two entities, this provides a platform for exploring the three broad routes through which differential accumulation can be achieved. Consequently, a corporation/corporate coalition can drive up its capitalisation faster relative to its competitors by:

1. increasing its differential earnings
2. increasing its differential hype
3. decreasing its differential risk (ibid.).

Consequently, (dominant) capitalists must try to exert their power over as many of the socio-ecological relations that bear most strongly on these three elementary particles (Nitzan and Bichler, 2009). Viewed from this perspective, the capitalist struggles to reconfigure socio-metabolic relations elucidated in the EDC literature (e.g. Schindler and Demaria, 2020) might usefully be understood as struggles to augment capitalist power via the three broad routes described above. However, as noted by Cochrane (2015: 99-100), before these power plays can be set in motion, capitalists must decide where, when, and how to intervene upon the world. In this regard, 'all capitalist

struggles, regardless of the extent of their effects, are local to somewhere' (ibid.). Similarly, the market participants (including capitalists) whose collective calculative evaluations contribute to the valuation of financial assets do not focus on some subset of capitalist endeavours deemed uniquely important to capital accumulation (ibid.). On the contrary,

> they survey the global panoply as sources of insight and sites for intervention. From the perspective of accumulation, any event that may bear on the elementary particles of capitalization will be accounted for. Those who can, and must, choose among various courses of action will direct their interventions to those sites perceived as of greatest concern to the elementary particles of accumulation.

However, given the highly conflictual and fractured nature of the capitalist nomos, there is no guarantee that such interventions will be successful. Indeed, as we shall now explore, this inherent uncertainty and indeterminacy - which stems from the forward-looking nature of (differential) capitalisation/accumulation - represents a key area of capitalist vulnerability; one that social and environmental justice activists can (and regularly do) exploit during the course of their struggles to resist dominant capital groups' efforts to re-shape the socio-ecological order in their interests (e.g. Cochrane, 2010; Cochrane and Monaghan, 2014).

3.1.5 Capitalising on capitalist vulnerability

This sub-section explores an activist-oriented strand of CasP scholarship that could potentially offer practical tools/insights for EDC scholar-activists. As argued previously, differential capitalisation/accumulation is a forward-looking/future-orientated endeavor. This involves a stream of future earnings (deriving from an income-generating asset) being discounted into a present value adjusted by some risk factor; the latter being determined by how (un)confident capitalists are that their earnings projections will be realised (Nitzan and Bichler, 2009). Capitalist vulnerability is, therefore, intimately linked with the inherent uncertainty surrounding future earnings and the ever-present risk that capitalists' expectations will not be realised. However, while dominant capital groups are certainly not *all powerful*, neither are they powerless (hence CasP). Thus, as argued previously, to accumulate differentially,

dominant capital groups must successfully exert their power over/sabotage as many of the key socio-ecological relations that bear most strongly on the elementary particles of (differential) capitalisation. If successful, these exertions of power will achieve at least one of the following objectives for the corporation/corporate coalition in question:

1. increase its differential earnings;
2. increase its differential hype
3. decrease its differential risk (Nitzan and Bichler, 2009; McMahon, 2022).

However, given the inherently conflictual and fractured nature of the capitalist universe, differential accumulation is far from guaranteed and failure (i.e. differential decumulation) is always a possibility (Cochrane, 2010; Cochrane, 2015; Cochrane and Monaghan, 2012). Consequently, it might also be argued that social/climate/environmental justice activists can try to inflict differential decumulation on their corporate adversaries by engaging in activities that have at least one of the following three impacts:

1. decreasing the target's differential earnings
2. decreasing the target's differential hype
3. increasing the target's differential risk.

In making this argument, I draw upon, but also extend, the work of Troy Cochrane and Jeff Monaghan (e.g. Cochrane, 2010; Cochrane and Monaghan, 2012). Cochrane and Monaghan's activist-oriented reading of CasP usefully shows how social justice activists can disrupt accumulation by becoming 'risk factors' that capitalists and investors must account for when valuing an asset or corporation. In other words, by increasing the target's differential risk (point 3, above). However, as far as I am aware, Cochrane and Monaghan do not explicitly argue that activists can disrupt accumulation via all three of the routes outlined above. Reflecting on these arguments in the context of EDC debates, we begin to see how CasP – and its elucidation of capitalist vulnerability – could potentially be useful for both EDC scholars and the environmental justice movements whose struggles they seek to understand and support. Cochrane and Monaghan's research does not focus on EDCs specifically. However, given their

cognate focus on how CasP insights might be mobilised by social justice activists to 'transform[] or dismantl[e] the unjust social relations on which capital depends' (Cochrane, 2010: 115), the potential synergies with the EDC literature are palpable (e.g. Scheidel et al., 2018; Temper et al., 2018a; Scheidel et al., 2020).[30]

Prefacing his argument with the important caveat that it is not intended as an attempt to definitively or absolutely define how social just activists should comprehend their struggles, Cochrane (2010) identifies three features of CasP that might usefully inform such struggles: '1) the arenas of resistance 2) the political economic aims of resistance 3) assessing the success of resistance' (ibid.: 115). Turning firstly to *the political economic aims or resistance*. For Cochrane, the recognition that accumulation is contingent on expectations regarding future earnings and perceptions of risk enables us to 'consider resistance as an effort to insert itself into this before-the-fact assessment' (ibid.). Thus, capitalists, investors, and other market participants may come to perceive an anti-corporate campaign as a risk factor that could jeopardise future earnings (ibid.). Consequently, such resistance will be accounted for quantitatively within capitalist valuation processes; both regarding its expected consequences for the magnitude and growth of future earnings as well as the heightened level of risk it implies for those earnings (ibid.). In other words, if such resistance is potent enough, it could precipitate differential decumulation by reducing the targeted firm/firms' differential profits and/or increasing its/their differential risk. However, since expectations are key, these risks do not necessarily have to materialise in the form of reduced earnings (ibid.). Thus, while investors' re-evaluations may conclude that a specific campaign no longer poses a threat, with differential capitalisation potentially reverting back to pre-campaign levels, even heightened volatility can run counter to capitalist interests (ibid.).

[30] As noted previously, the EDC research community is associated with the Barcelona School of PE, who while critical of 'capitalism and its unquenchable metabolism' are 'always engaging also with the potential and conditions for transformative alternatives' (Kallis cited in Demaria, 2017: 28-29).

Cochrane and Monaghan (2012) label these campaigns, which aim to disrupt the accumulatory process, political economic disruption campaigns (PEDCs). As they note, such campaigns can encompass a diverse range of objectives, tactics, and activities. As they explain:

> Some make use of old and familiar tactics. Others are tactically unpredictable and creative. Some espouse an absolute commitment to nonviolence. Others engage in property destruction, kidnapping, and assassination...Whether these campaigns aim to reform or negotiate certain corporate activities, evict them from particular spaces, or aim to explicitly shut down their operations, they all target the political-economic body of corporate power: capital (ibid.: 96-97).

The diversity described above speaks to Cochrane's second point regarding *the arenas of resistance (*2010: 115*)*. As Cochrane argues, because differential accumulation depends on a whole multitude of power processes and socio-ecological relations that extend far beyond the arena of production, anti-corporate resistance should endeavour to identify and disrupt all the social relations that bear most strongly on the elementary particles of capitalisation (ibid.). In this regard, CasP underscores the fact that - regardless of magnitude or tactics - social movements and activist groups can make a difference. They possess social agency and this agency enables activists to intervene in accumulation processes, sometimes in unanticipated ways (ibid.). Thus, instead of proposing that social justice movements and activists expand their list of targets and/or demands, 'CasP unifies the diverse tactics and strategies that activists are already employing' (ibid.).

As Cochrane and Monaghan (2012) argue, since differential accumulation is central to how capitalists gauge their own success/failure, it simultaneously constitutes a tool for assessing the effectiveness of PEDCs targeting specific corporations (ibid.). Of course, there are many other valid criteria that activists can use to gauge the success/failure of their PEDCs (ibid.). However, as Cochrane and Monaghan argue, CasP's 'differential perspective' does usefully enable activists to assess their campaigns from the vantagepoint of the capitalists themselves (ibid.). From this vantagepoint activists are better positioned to answer the crucial question of whether or not their PEDC damaged its intended targets (ibid.). As they explain,

> (i)f a campaign's actions are associated with particular moments of differential decumulation, or, more importantly, an entire campaign is associated with a trend of differential decumulation, then it seems, all else equal, fair to judge the campaign a success, even if specific goals and outcomes have not been achieved (ibid.)

However, it is important to tread carefully when seeking to tie the gyrations of differential accumulation to any specific cause; especially considering the myriad forces bearing upon – and being rendered by – any particular corporate entity (ibid.) Nevertheless, they argue, with due caution, activists should not waver from claiming victory if their campaign accompanies a period of (differential) accumulatory decline for the targeted corporation(s) in question (ibid.). Thus, in a world where activists are increasingly engaging in confrontational action to address innumerable injustices, CasP's differential accumulation model constitutes a method for gauging the success of PEDCs that challenge capitalist power (ibid.). To illustrate this argument, Cochrane and Monaghan explore the differential impacts of three PEDCs targeting three separate corporations whose controversial activities had caught the attention and ire of campaign groups. In each case, Cochrane and Monaghan identify significant albeit relatively short-lived periods of differential decumulation which they attribute to the respective PEDCs being waged at those times (ibid.).

Reflecting on the fractured nature of (dominant) capital, Cochrane and Monaghan argue that this provides social justice activists with opportunities to exploit the fault lines that separate its competing distributional coalitions. However, they also caution that, because accumulation is always differential, the successful targeting of one corporation or corporate coalition, will unavoidably boost the differential accumulation of the target's competitors. For example, when anti-sweatshop campaigners successfully targeted Nike, leading to a period of differential decumulation, this inevitably served to bolster the relative accumulatory fortunes of Adidas (Nike's nearest rival). However, while this latter point means that PEDCs are inherently reformist, rather than revolutionary, that does not mean PEDCs should not be pursued. As they explain,

> (t)he differential interests of capitalists are a vital reality of capitalism, and everything short of undermining the institution of capital itself will be of differential benefit to someone. Therefore, we can stop lamenting this result and embrace the small gains through broad-based mass movements. In the realities of struggle. These gains are notable ameliorations in the immediate day-to-day experience of life under capitalism. Although this change might not directly undermine capitalism, it does improve people's lives and demonstrates the capacity of outsiders to intervene in the accumulatory process (ibid.: 98).

Reflecting on these arguments, the potential for productive dialogue between CasP and the EDC literature is palpable; especially considering the latter's focus on environmental justice activism and its essential role in challenging the powerful actors/interests that perpetuate unjust and unsustainable uses of the environment (e.g. Scheidel et al., 2018; Temper et al., 2018b). Moreover, since this activist-orientated CasP scholarship focuses chiefly on how social justice activists can (and frequently do) exploit capitalist vulnerability by deploying tactics that increase their corporate adversary's differential *risk*, there would seem to be the potential to break new ground: namely, in addition to bringing such a focus to environmental justice activism in the context of EDCs, by also investigating how environmental justice activists might (and potentially do) exploit capitalist vulnerability in two other important ways. That is, by deploying tactics that: (a) decrease their corporate opponents' differential hype; or (b) reduce their differential earnings.

3.1.6 The power creorder of dominant capital

Although the terms 'power' and 'dominant capital' have been a recurring feature of our discussion of CasP, we have yet to explore, in detail, how Nitzan and Bichler (2009) theorise these concepts. To initiate this exploration, it may be helpful to firstly consider Nitzan and Bichler's (2009) concept of 'creorder'; their verb-noun neologism to articulate the dynamic tension between continuity and change that inheres in the ongoing reproduction of any social order. As they explain, every creorder represents 'a state in process, a construct reconstructed, a form transformed' (ibid.: 305). Any number of creorders are possible (e.g. a hierarchical dictatorship or bureaucracy, a horizontal direct democracy, or any number of social forms in between these two

poles). However, regardless of its specific properties, a creorder always comprise 'a paradoxical duality – a dynamic creation of a static order' (ibid.: 305).

While capitalism, according to Nitzan and Bichler (2009), constitutes a particular form of 'power creorder', any form of power creorder, they argue, is inherently ridden with tension, conflict, and instability. Thus, while power suggests a capacity for imposing order, imposition presumes resistance; both from those subjected to it and from others seeking to enforce their own (ibid.). This force/counter-force dialectic, and the habitual tension it produces, means all power creorders are inherently unstable (ibid.). Slack at one side releases pressure previously built up elsewhere, while a stronger force moving along one path trumps over a weaker one coming the other way (ibid.). Moreover, because the surmounting of resistance involves the creation of a novel order, power's very presence implies 'a built-in pressure for change' (Nitzan and Bichler, 2009: 305).

This conceptualisation of a 'power creorder' is intimately bound up with Nitzan and Bichler's (2009: 17) understanding of power itself, which they define as 'confidence in obedience'. This definition of power

> expresses the certainty of the rulers in the submissiveness of the ruled. When this confidence is high, the rulers actively shape their society. They view its trajectory as customary and natural, while treating revolts, uprisings – even revolutions – as mere disturbances. By contrast, when this confidence is low, the rulers tend to react rather than initiate. Social development loses its coherence, while revolts, uprising and revolutions suddenly become manifestations of systemic chaos (ibid.).

Reflecting on the above in the context of contemporary capitalism, Nitzan and Bichler argue that capital embodies this fundamental relationship between the rulers' confidence and the obedience of those who are ruled (ibid.). Thus, the accumulation of capital symbolises dominant capital's (i.e. the largest corporations and important government organs/institutions at the centre of the accumulatory process) changing ability to (re)shape, transform, and control society against resistance (ibid.).

As outlined previously, these creordering efforts are intimately bound up with the universal ritual of capitalisation, which, for Nitzan and Bichler, constitutes the capitalist

creorder's central algorithm; the decisive process through which the commodification, structuration, and restructuration of capitalist power occurs (ibid.). Within the capitalist creorder, not only are owners compelled to preserve their power, but to struggle to increase it; not just to defend their differential capitalisation, but to augment it via differential accumulation (ibid.). For Nitzan and Bichler, this imperative to increase one's power produces a potent gravitational force, which serves to pull capital's independent units closer together, driving them to coalesce and consolidate into ever greater entities (ibid.). These consolidating tendencies eventually lead to the formation of 'tight constellations of large corporate–government alliances' (ibid.). When Nitzan and Bichler use the term 'dominant capital', it is these 'tight constellations' that they are referring to (ibid.).

To many, Nitzan and Bichler's inclusion of government organs/institutions alongside corporations in their definition of dominant capital may seem strange; especially given that most political economic theories tend to distinguish between 'the state' (inclusive of government) and capital (inclusive of corporations). However, Nitzan and Bichler provide a strong theoretical-empirical justification for this conceptualisation. As discussed previously, Nitzan and Bichler reject the notion that it is possible – or helpful – for analyses of capitalism to distinguish between 'politics' and 'economics'. This rejection is rooted in an empirically-grounded theoretical analysis of the contemporary 'capitalist mode of power', whose central organisational entities are government organs and corporations (ibid.). However, although corporations and governments are distinct types of entity, their interrelations run deep; so deep that, when it comes to explaining the power underpinnings of differential accumulation, it would appear that 'the capitalist government…is embedded not only in the so-called "primitive" forms of accumulation, but potentially in every single bit of it' (ibid.: 296).

To illustrate the central role of government power in the differential earnings of corporations, Nitzan and Bichler draw on the example of Microsoft. Noting how Microsoft's owners can only profit differentially from its proprietary software by restricting access to paying customers, they then consider how the latter ability remains crucially dependent on intellectual property rights; whose

existence/enforcement are fundamentally rooted in government power. Crucially, then, Microsoft's differential accumulation is largely dependent on the degree to which it can mobilise/capitalise government power for its own purposes (ibid.). Imagining a scenario where Microsoft's software is no longer protected by government power, Nitzan and Bichler argue that the most probable outcome of such a scenario would be a sharp drop, if not crash, in the company's capitalisation and earnings (ibid.). With this and countless other examples in mind whereby dominant capital's differential accumulation capitalises government power, Nitzan and Bichler offer the state of capital concept as a means of transcending the economic-politics dualism. As they explain:

> The power to generate earnings and limit risk goes far beyond the narrow spheres of 'production' and 'markets' to include the entire state structure of corporations and governments…As we see it, the legal–organizational entity of the corporation and the network of institutions and organs that make up government are part and parcel of the same encompassing mode of power. We call this mode of power *the state of capital*, and it is the ongoing transformation of this state of capital that constitutes the accumulation of capital (ibid.: 8)

These arguments have far-reaching implications for how we theorise capital in the context of EDC; and, more specifically, for how we theorise, the roles - and interrelations between - government organs/institutions and corporations in this context. In this way, the above arguments also speak directly to the point raised at the end of Section 2.4.2.3 regarding the failure of *Marxist explanations* to adequately theorise capital(ism); capital accumulation; and the analytical role of power *within that conceptualisation*. Thus, bringing these arguments together, there would seem to be considerable potential for CasP – with its reconceptualisation of (dominant) capital to *include* corporations *and* government organs; and its replacement of the state-capital dualism with *the state of capital* – to address some of the power problems identified in the earlier critique of *Marxist explanations*.

3.1.7 Regimes of differential accumulation

Drawing on their theoretical-empirical investigations into the state of capital, Nitzan and Bichler (2009) argue that dominant capital pursues differential accumulation via two broad routes - 'breadth' and 'depth - which can each be subdivided into two further sub-categories - 'internal' and 'external'. This four-way taxonomy can be seen in Table 3.1.

Table 3.1 Nitzan and Bichler's 'Regimes of differential accumulation'

	External	Internal
Breadth	Green-field	Mergers & Acquisitions
Depth	Stagflation	Cost cutting

Source: Nitzan and Bichler, 2009: 329

According to Nitzan and Bichler, breadth, which requires earnings to grow faster than the average can be achieved one of two ways: (1) via 'green-field investment' (internal breadth); or (2) through 'mergers and acquisitions' (external breadth) (ibid.). Nitzan and Bichler argue that 'greenfield expansion [external breadth] is a double-edged sword for dominant capital', which can both impede and boost differential accumulation; and thus, undercut as well as augment its power (ibid.: 18). If successful, green-field investment will enable a corporation or corporate coalition to accumulate differentially by expanding its capacity and hiring new workers faster than the average' (ibid.: 329-330). However, aside from the harmful ecological consequences, from a purely business perspective, too much green-field growth risks impacting depth negatively by driving down prices and earnings per employee (ibid.). As such, Nitzan and Bichler argue that dominant capital tends to favour mergers and acquisitions (internal breadth) over green-field growth (external breadth). This is because mergers and acquisitions enable corporations to increase *their own* sales and market share

without impacting the market-wide total. In contrast to its external counterpart, then, internal breadth does not exert downward pressure on prices or earnings per employee. In this regard, because mergers and acquisitions enable dominant capital to increase its profit share relative to the average, internal breadth represents the least risky differential accumulation regime. Alongside these arguments, Nitzan and Bichler (ibid.: 339) present empirical data from the US showing that over the last century mergers and acquisitions/internal breadth have become increasingly favored by capitalists relative to green-field growth/external breadth. As they explain,

> (a)t the end of the nineteenth century, money put into amalgamation was equivalent to less than 1 per cent of green-field investment; a century later, the ratio surpassed 200 per cent. The trend growth rate…suggests that, year in, year out, mergers and acquisitions grew 3.4 percentage points faster than new capacity (ibid.).

Much like Nitzan and Bichler's argument regarding the important role of sabotage in dominant capital's differential accumulation, these arguments call into question the prevalent conviction - which EDC scholars generally share with Marxists and liberals - that capitalism is addicted to economic growth (ibid.). However, as Nitzan and Bichler argue, although '(t)his conviction… is so strong that many now conflate growth and accumulation as if they were one and the same', these are distinct phenomena that while frequently aligned can just as often be antagonistic to one another' (ibid.: 18). To be clear, this is emphatically not a critique of the eminently sensible argument put forward by EDC scholars, eco-Marxists and others that growth is ecologically damaging and fundamentally unsustainable. Similarly, neither am I arguing that EDC scholars share the questionable liberal belief that growth can continue in perpetuity. What I am questioning, however (drawing on the above insights), is the notion that dominant capital always desires economic growth.[31]

[31] Although he does not articulate it in the language of CasP, ecological economist and (Barcelona School) political ecologist Kallis (2015) appears to understand that accumulation does not necessarily require growth and that Marxist political economy does not sufficiently account for this: https://undisciplinedenvironments.org/2015/10/27/is-there-a-growth-imperative-in-capitalism-a-response-to-john-bellamy-foster-part-i/

When dominant capital pursues differential accumulation via depth, there are also two broad routes it can take: (1) stagflation (external depth); or (2) cost-cutting (internal depth). According to Nitzan and Bichler, the external depth/stagflation (i.e. inflation plus stagnation) route, which involves raising prices faster than the average, is by far the most potent of the depth regimes. When successful, those with the power to accumulate differentially through external depth, redistribute income to their benefit, thus augmenting that power (ibid.: 19). However, as Nitzan and Bichler argue, while external depth is a highly effective route to differential accumulation, it is also an extremely conflictual one. This is because, in addition to redistributing income between different groups, external depth also tends to manifest as stagflation (ibid.). Thus, rather than being accompanied with stability and growth, external depth is typically concomitant with crisis and stagnation (ibid.). Compared with breadth, then, external depth represents a riskier and more uncertain route to accumulation. Nevertheless, the high returns associated with external depth are typically commensurate with these increased risks. Consequently, 'when dominant capital finds itself gravitating toward conflictual inflation, the common result is accumulation *through* crisis' (ibid.). Nitzan and Bichler's external depth thesis also finds support in their empirical research. This research suggests that, since the 1960s, the differential accumulation of what they term the *Weapondollar-Petrodollar Coalition* – a loosely organised coalition of armament firms, the Organisation of Petroleum Exporting Companies (OPEC) oil cartel, the leading oil conglomerates, large financial corporations, and engineering firms – has both benefitted from and helped fuel/sustain 'energy conflicts' in the Middle East (Nitzan and Bichler, 1995, 2009).[32]

Reflecting on this taxonomy, Nitzan and Bichler argue that it is imperative that we distinguish the actions of any individual large firm from a broader investigation of dominant capital's collective behaviour (ibid.). Thus, while an individual firm may achieve success by combining different aspects of depth and breadth, this is unlikely to

[32] At the time of writing (April 2023), these arguments seem especially salient as the leading oil firms and arms dealers are again making vast profits following Russia's invasion of the Ukraine (Binyon, 2023).

hold for dominant capital in the aggregate (ibid.). Consequently, rather than understanding depth and breadth as corporate strategies, it is more useful to conceptualise them 'as overall regimes of differential accumulation (ibid.: 331). Viewed from this perspective, they argue, we begin to understand how 'the broader conditions that are conducive to one regime often undermine the other' (ibid.).

But how might these 'regimes of differential accumulation' relate to EDC? This is a question that has yet to be explored in the literature. However, drawing on our prior knowledge of EDC, we can nevertheless offer some tentative thoughts on this question. Thus, of the four regimes identified by Nitzan and Bichler, green-field expansion (i.e. external breadth would) is seemingly the primary driver of EDC. Indeed, most of the EDCs documented in the EJAtlas seem to be related to some form of green-field growth/external breadth) – for example, the expansion of oil, gas, and mineral extraction frontiers, new infrastructure projects etc. (Temper et al., 2015; Temper et al., 2018a). Thus, from a socio-ecological perspective at least, there is certainly no shortage of green-field growth occurring, even if - as Nitzan and Bichler argue - this is not dominant capital's most favoured regime of differential accumulation. However, there is evidence that all four regimes are implicated in EDC. A useful illustration of this is the EDC that was sparked following the Deepwater Horizon disaster in the Gulf of Mexico in the US. Thought to be the largest marine oil spill in history, British Petroleum's (BP) rapid green-field expansion (i.e. external breadth) into (ecologically and financially) risky deep-sea oil exploration in the Gulf of Mexico would appear to be the primary driver of this disaster (and EDC). However, there is also evidence that BP's aggressive cost-cutting measures (i.e. internal depth), which were ramped up following a series of debt-leveraged takeovers of rival firms (i.e. internal breadth), was also a key factor (Lustgarten, 2010). Consequently, the relationship between Nitzan and Bichler's four regimes of differential accumulation and EDC emerges as an intriguing topic that warrants further empirical exploration.

3.2 Energising and ecologising capital as power

At first sight, CasP's contention that capital is 'a symbolic representation of power' (Bichler and Nitzan, 2018: 1) may not seem to align with the materialist orientation of the EDC literature (e.g. Scheidel et al., 2018). However, conceptualising capital as a *symbolic* representation of power *is emphatically not* tantamount to an argument that materiality is unimportant. Consequently, this conceptualisation *in no way* negates the fundamental insights of EE regarding the dependence of all (political) 'economic activity' on biophysical processes and energy/material flows (e.g. Martinez-Alier and Muradian, 2015). Indeed, although much of the earlier CasP literature tended to elide the biophysical foundations of the *capitalist mode of power*, in recent years there has been a concerted effort by some CasP scholars to correct this imbalance (e.g. Di Muzio, 2012, 2015; Fix, 2017, 2018; Fix et al., 2019; Bichler and Nitzan, 2020a; Cochrane, 2020). Thus, while these more biophysically attuned CasP studies should interest EDC scholars, they could also usefully inform parallel debates in EE regarding 'value theory' and the analytical role of biophysical resources in political economic analyses (e.g. Pirgmaier, 2018, 2021; Røpke, 2021; Hornborg, 2022). All of the CasP studies cited above have interesting and insightful things to say about the biophysical foundations of capital accumulation. However, for the purposes of this thesis, I will focus principally on Tim Di Muzio's (2015: ix) investigations into the development of what he has termed 'carbon capitalism and its concomitant petro-market civilization'.

3.2.1 Carbon capitalism, social reproduction and petro-market civilisation

According to Di Muzio (2014c: 19), the key contribution of Nitzan and Bichler's CasP framework is its ability to 'conceptualize "really existing capitalism" anew in the present'. However, noting that Nitzan and Bichler's historical sketch of the capitalist mode of power's historical development remains less fully developed, Di Muzio identifies a crucial gap in their 'genealogy of capital' (ibid.). Consequently, notwithstanding their groundbreaking research on the differential accumulation of the *Weapondollar-Petrodollar Coalition* (e.g. Nitzan and Bichler, 1995), this genealogy largely overlooks energy's decisive role as fundamental enabler of the capitalist mode

of power (ibid.).[33] To address this oversight, Di Muzio (e.g. 2014c, 2015, 2018) combines Nitzan and Bichler's (2009) insights with a diverse range of other critical scholarship (e.g. Heinberg, 2011; Smil, 2011; Endghal, 2004). In doing so, Di Muzio (2014c) seeks to strengthen Nitzan and Bichler's theoretical explanation of CasP by elucidating the fundamental interrelations between fossil fuels and globally extensive patterns of social reproduction; the latter being chiefly (re)shaped by dominant capital (i.e. those corporations with largest market capitalisations, usually in conjunction with key government organs/institutions (ibid.).

One notable product of these endeavors is Di Muzio's (2015) book *Carbon Capitalism: Energy, Social Reproduction and World Order*. Offering a novel theorisation of the global political economic order, this work is founded upon the ontological presumption that the energetic underpinnings of civilisation, rather than being ancillary to political economic inquiry, are indispensable for comprehending and elucidating its development (ibid.). However, rather than endorsing energy determinism, Di Muzio's analysis considers energy's contextual embeddedness in social (capitalist) property relations, the conflictual dynamics that inhere within these, and their generative role in the (re)constitution of a global order he conceptualises as 'a hierarchical petro-market civilization' (ibid.). Di Muzio defines *petro-market civilization* as

> an historical and contradictory pattern of civilizational order whose social reproduction is founded upon nonrenewable fossil fuels, mediated by the price mechanism of the market and dominated by the logic of differential accumulation (ibid.: 5).[34]

Di Muzio argues that capital constitutes petro-market civilisation's key institution (ibid.). Moreover, dominant capital can only accumulate at its present magnitude and

[33] Since Di Muzio (2014c) wrote this, Nitzan and Bichler have made significant efforts to explore the interrelations between energy and the capitalist mode of power (e.g. Bichler and Nitzan, 2017, 2020; Fix et al., 2019).

[34] Combining Stephen Gill's (1995) notion of 'market civilization' with Nitzan and Bichler's (2009) insight that capital accumulation is a differential endeavor, Di Muzio's concept of petro-market civilization is simultaneously underpinned by the more fundamental insight that fossil fuels are central to the latter's existence and continued reproduction (e.g. Heinberg, 2011; Smil, 2011).

scale due to the energy surpluses afforded by fossil fuels combined with the transformation of 'previous patterns of social reproduction tied more directly to photosynthesis and low-carbon energy growth' (ibid.: 5-6). It is against this ontological-theoretical backdrop that Di Muzio coins the term *carbon capitalism*; a term underpinned by the insight that the universalisation and magnitude of capital accumulation, and the global proliferation of energy profligate patterns of social reproduction, would not have been possible in the absence of plentiful, accessible, and affordable fossil fuels (ibid.).

3.2.2 The capitalisation-energy-social reproduction nexus

To guide his theoretical-empirical exploration of 'carbon capitalism and its related petro-market civilizational order' (ibid.: 5), Di Muzio traces the interconnections between energy, social reproduction, and capitalisation– what he terms the 'the capitalization-energy-social reproduction nexus' (ibid.: 53). Justifying his focus on capitalisation, Di Muzio argues - following Nitzan and Bichler - that capitalisation represents contemporary capitalism's dominant ritual (ibid.). He then presents data to illustrate the staggering growth of global capitalisation that occurred over the 104 year-period between 1910 and 2014 (see Figure 3.1). While 'the [estimated] value of all outstanding securities' in 1910 stood at US$5.5 trillion (in 2014 inflation-adjusted dollars), by 2014 this figure had ballooned to approximately US$225 trillion; 'an increase in debt and equity from 1910 of 4300 percent' (ibid.). Di Muzio also notes how capitalisation has increased especially rapidly since the last decade of the twentieth century (ibid.).

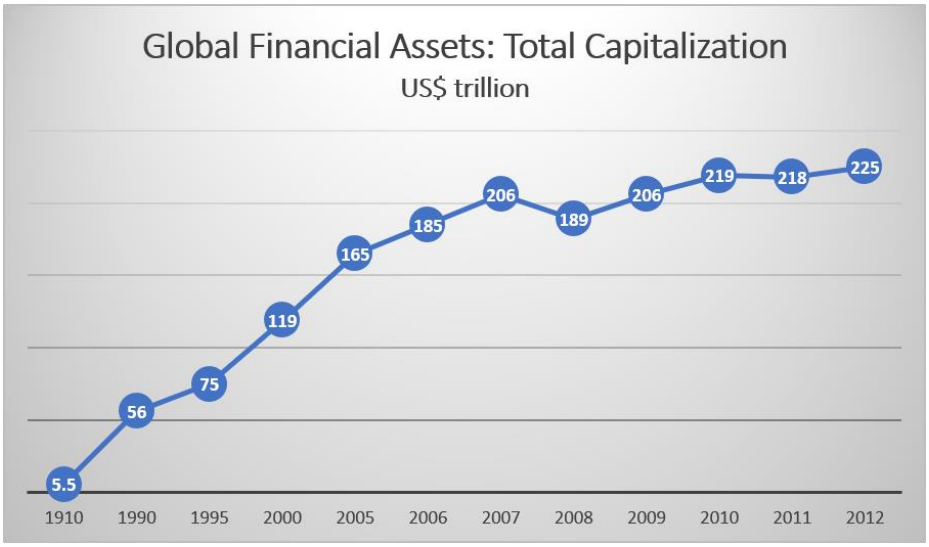


Figure 3.1 Global Financial Assets: Total Capitalisation (US$ trillion).
Source: Di Muzio, 2015: 42.

Drawing on Nitzan and Bichler's insight that these securities represent the capitalisation of expected *future* earnings, Di Muzio draws the logical conclusion that global expectations regarding future earnings must have also increased correspondingly (ibid.). He then poses the question of how this astonishing rise in global capitalisation (and expectations about future earnings) can be explained. With the caveat that it is not the only important factor, Di Muzio argues that since energy represents the capacity to perform work while surplus energy confers the ability to undertake greater work, it follows that these dramatic increases 'in capitalization correspond with increasing energy consumption across the world' (ibid.: 41). Thus, drawing on Smil's estimate that pre-agricultural society's harnessed approximately 9.5 million British Thermal Units (BTUs) of energy per capita annually, Di Muzio notes how by the late nineteenth century Britain - the first society to consume large quantities of fossil fuels (at that time, in the form of coal) in a sustained manner, 'was consuming 95million BTUs per capita' (ibid.: 43). By 2005, the US was metabolising '313 million BTUs per capita', mostly in the form of oil, gas, and coal, to fuel the world's largest national economy (ibid.). In the same year, global energy consumption was a staggering '520 *quadrillion* BTUs', the latter equating to approximately '55 billion times more energy than pre-agricultural societies' (ibid.). With these numbers in mind, the

argument that the growing volume of capitalisation over time coincided with an energy consumption revolution founded upon fossil fuels begins to make sense (ibid.). As Di Muzio explains,

> the transition to consuming ever greater amounts of fossil fuels has given us the greater, but radically uneven, capacity to do work on the natural world and our own built environments, while at the same time oil and gas corporations seek out even more energy to continue patterns of globalized social reproduction that are highly dependent on carbon energy, leading to the carbonization of everyday life (ibid.: 43-44).

For Di Muzio, the institutions of private ownership and the corporation have played a central role in these transformations, enabling powerful actors to secure and control (stores and flows of) energy for private gain (ibid.). As Di Muzio notes, initially the scale of capitalisation was small, comprising 'the "national" debt and a few joint-stock companies capitalized on nascent securities markets' (ibid.: 44). Thus, even by 1840, Britain and other foreign governments' national debts on the London securities market comprised 89 percent of all securities traded globally (ibid.). However, between 1850 and 1900 the quantity of listed firms and global stock exchanges grew rapidly, while 'the capitalization and public debts of European states engaged in international colonialism and warfare' did the same (ibid.: 44). Thus, from a small pool of large transnational firms, by 1990 there were 20,726 listed on the world's major exchanges; and by 2010 this number had surged to 45,508 (ibid.). At the same time, the 500 largest global firms by market capitalisation comprise approximately '42 percent of global market capitalisation at US$31 trillion of the US$67 trillion outstanding' (ibid.).

Therefore, since the dawn of the 'carbon era', and the intensified extraction/consumption of fossil fuels, the world has simultaneously witnessed huge proliferation of capitalisation and the organisations, regulations, and institutions that enable it (ibid.). However, as Di Muzio argues, because capitalisation expresses capitalist's expectations regarding future earnings, which in turn depend on their ability to exert power over society and nature, it is important 'to consider capitalization, energy and social reproduction as practically and theoretically interlinked' (ibid.). To illustrate this point, Di Muzio notes how 'the carbon era' is

characterised by social reproduction that is considerably more globalised than that which preceded it (ibid.).

To illustrate how modern globalised forms of social reproduction are decisively dependent on carbon energy, Di Muzio explores this relationship through the proxy of global trade. As he notes, between 1950 (when such statistics begin) and 2013, global trade in goods and services surged from US$500 billion to US$23.4 trillion, equating to 4580 percent increase (ibid.). This explosion of international trade has been enabled by the innovation of mass containerisation and, even more crucially, the shift to oil as the primary transportation fuel (ibid.). Reflecting on the wider implications of these developments, Di Muzio argues that prior to carbon-energy usage becoming globally extensive, the daily lives/lifestyles of most people were not mediated/arbitrated by transnational markets (ibid.). Consequently, as Di Muzio explains, the prevailing global order where the distribution of life chances and key goods and services are arbitrated and mediated by global markets is a relatively recent development; arguably 'only a few centuries in the making—accelerating and amplifying mostly after World War II if we are generous' (ibid.: 45). Therefore, contemporary modes of survival and social reproduction are now completely reliant upon having the financial capacity to purchase goods and services on the market (ibid.).

For Di Muzio, another key manifestation of these ongoing shifts can be found in the demographic transformation whereby a once primarily rural global population is being progressively supplanted by one which is predominantly urban/suburban and, for more than 1 billion persons, inadequately sheltered (ibid.). As Di Muzio notes, it has been estimated that, by 2050, 79 percent of the world's population will comprise city dwellers (ibid.). However, because most urbanites have minimal access to the means of production or land beyond wage relationships, this renders them almost totally dependent on market exchange for accessing life's necessities (e.g. food, clothing, shelter etc.) (ibid.). Moreover, the logistics underpinning globally integrated supply chains are so geographically extensive that entire populations are essentially totally dependent on the enormous oil-hungry assemblage of diesel lorries, cargo planes, and supertankers transporting not just televisions, toys, and cosmetics, but essentials such

as medical equipment, fertiliser, and food. They are similarly dependent on a colossal high energy-consuming infrastructural/logistical network of airports, motorways, freight terminals, ports, and loading docks. In this way, only an increasingly diminishing portion of the world's population could be regarded as anything approaching *completely* self-sufficient with regards to meeting their basic needs such as a nutritious diet (ibid.). Reflecting on the above, Di Muzio argues that instead of treating 'energy, capitalization and social reproduction as distinct categories', it is far more enlightening to conceptualise them 'as deeply interconnected' (ibid.).

3.2.3 The power of the oil and gas business: capitalising a future unsustainable

Given this fundamental dependence on carbon energy (especially oil), Di Muzio's argument that 'the power of the oil and gas industry has been the most significant sector of dominant capital shaping and reshaping…globalized social reproduction' is hardly surprising (ibid.: 15). Thus, while acknowledging that the oil and gas sector is by no means all powerful, Di Muzio points to the sector's differential capitalisation, arguing that this provides a clear indication of its 'differential power to shape the social process' (ibid.). Di Muzio also identifies a confluence of factors which imply that the power of the fossil fuel business is - to some degree - self-perpetuating. Thus, the self-perpetuating nature of this power is intimately connected to how

> the reproduction of a petro-market civilization requires both growth and carbon energy due to choices made about the human-built environment and the way in which money creation is capitalized and expanded through interest-bearing loans and state deficits (ibid.).

The capitalisation of money creation is intimately linked with availability of surplus (carbon) energy. Indeed, at its most fundamental, such capitalisation is essentially also the capitalisation of surplus energy (ibid.). This helps explain why, alongside the oil and gas business, the banking sector is the most capitalised/powerful sector of the global political economy (ibid.).

Despite the increasingly grave trajectory of petro-market civilisation and the very real prospect of climate/ecological breakdown, it seems that capitalists and investors in the oil and gas business (including the banking sector) remain intent on 'monetiz[ing]the

destruction of the biosphere through the sale and combustion of ever more carbon energy' Di Muzio, 2015: 15). To illustrate this point, Di Muzio compares the capitalisation of the leading publicly listed oil and gas companies with that of the firms comprising the WilderHill NEX; a global index of companies primarily focused on renewable energy technologies and services (see Figure 3.2, below). For Di Muzio, this comparison is instructive because capitalisation is largely an expression of investor expectations/confidence regarding future earnings (ibid.). Thus, because the ritual of capitalisation is future-oriented, oil and gas firms' market capitalisations can be considered a key indicator of how capitalists and investors expect the future to unfold (ibid.).

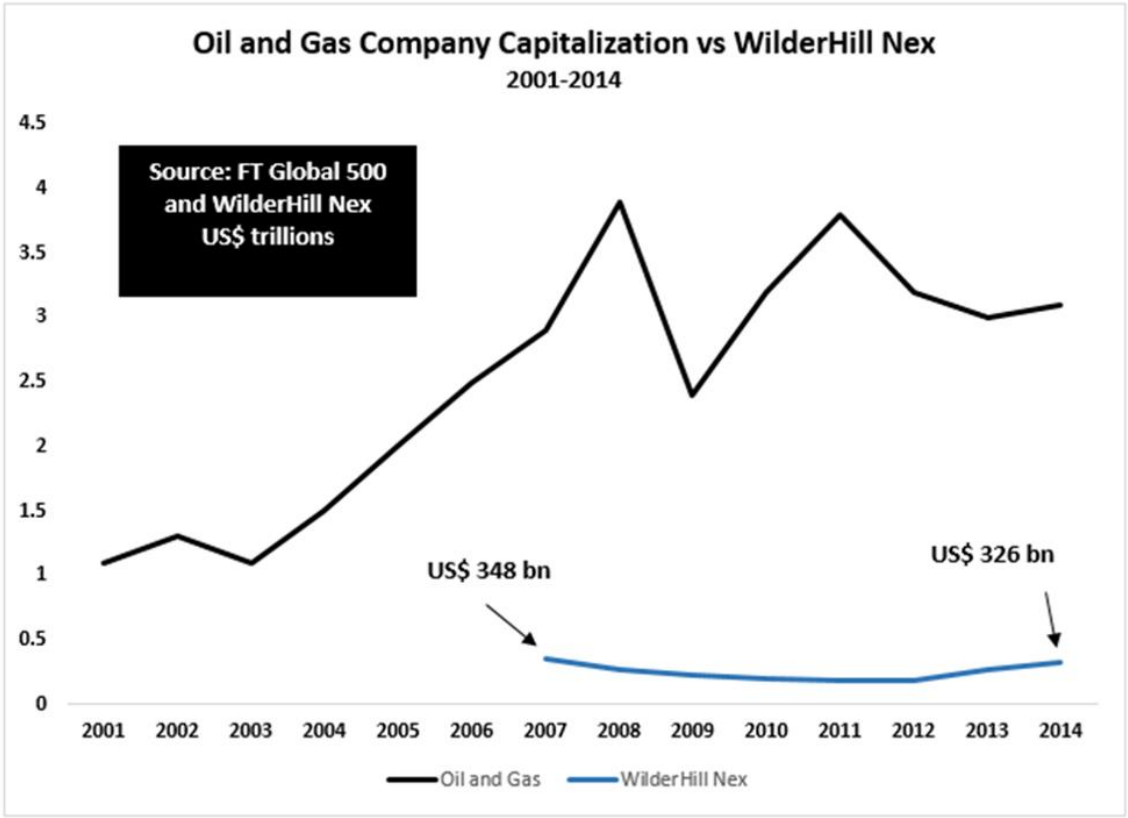


Figure 3.2 Oil and Gas Company Capitalisation vs WilderHill Nex
Source: Di Muzio, 2015: 42.

As can be seen in Figure 3.2, the capitalisation of the leading oil and gas firms dwarfs that of the WilderHill Nex. Thus, as of 2014, the oil and gas business' capitalisation

(US$3.1 trillion) was approximately ten times larger than that of the WilderHill Nex (US$326 billion); indicating that (in 2014) investors were decisively not expecting a future scenario in which renewable energy corporations displace oil and gas firms as the most profitable and powerful players in the global energy market (ibid.).[35] Moreover, following Di Muzio, it could also be argued that this situation indicates investors 'are effectively capitalizing the power of the [oil and gas] industry to render the planet uninhabitable for future generations' (ibid.: 15). Within the last decade, this worrying trend described above has manifested itself particularly acutely in the so called 'fracking revolution' (e.g. Di Muzio and Olvadia, 2016). This development, which has generated dramatic increases in 'unconventional' oil and gas extraction (particularly in the US), is often framed by its supporters as a triumph of capitalist innovation and technological ingenuity (e.g. Connell, 2019). However, from the perspectives of CasP and carbon capitalism, this phenomenon might more usefully be understood as the product of oil and gas business interests' concerted efforts to augment their differential power via green-field expansion (i.e. external breadth) (Nitzan and Bichler, 2009) and the extraction and monetisation of 'unconventional' oil and gas (Di Muzio and Olvadia, 2016). As we shall explore shortly, these efforts are increasingly being contested by communities living on the 'unconventional' oil and gas extraction frontiers and their allies in the 'global anti-fracking coalition' (e.g. Steger and Milicevic, 2014; Lloveras et al., 2021). However, before embarking on this exploration of fracking conflict, it may be useful to reflect on a further example of energy focused CasP scholarship that could usefully inform EDC investigations; especially those concerning the expansion of fossil fuel extraction and energy infrastructures more generally.

[35] More recently, Hager's (2021) research found that capitalists and investors continue to capitalise an unsustainable future through their investments in the oil and gas business.

3.2.4 Energy, hierarchical power, and conflict

Taking the CasP approach in a similar direction to Di Muzio (2015), Fix (2015; 2019; 2021) explores the relationship between energy and hierarchy under capitalism. Drawing primarily on US data, Fix (2017) identifies a strong and positive correlation between hierarchy (measured using the proxy of organisation size) and energy capture/use. In other words, the more hierarchical a society and its organisations become, the more energy they metabolise. Fix's (2017) initial tentative explanation for this finding was that, by enabling large-scale human coordination across time and space, hierarchical power and the forms of organisation associated with it, may enable society to capture and harness more energy, which in turn facilitates the collective undertaking of more activities that increase human wellbeing. However, Bichler and Nitzan (2017) have offered an alternative explanation for the correlation identified by Fix. Noting how a considerable portion of the energy metabolised by hierarchical societies contributes towards the erection and maintenance of hierarchies, Bichler and Nitzan argue that, rather than wellbeing, a significant proportion of this energy-intensive growth is devoted 'to augmenting and defending power as such' (ibid: 26).

As discussed previously, the CasP approach conceptualises the struggle for differential accumulation as a quest motivated by the capitalist imperative to increase one's own organisational power relative to that of other capitalists (e.g. Nitzan and Bichler, 2009). Bringing this conceptualisation into dialogue with Fix's (2017) findings, Bichler and Nitzan (2017) argue that, because capitalists are driven by the urge to increase their relative power, this results in a ceaseless competition to construct ever-larger hierarchical organisations; a competition that occurs irrespective of whether or not such organisations are actually more successful at capturing energy. While this competitive power-driven process inheres in the growth and expansion of corporations, it also manifests itself in the expansion of government organs, armies, police forces, the legal system, private security contractors, and lobbying/PR agencies etc.; whose power is frequently capitalised by business corporations (ibid.). Moreover, because the accumulation of hierarchical power invariably arouses resistance from communities on the receiving end of this power, capitalists are driven to construct

even larger/more extensive hierarchies and inflict ever more strategic sabotage for the purposes of limiting and containing such resistance (ibid.). In the context of EDCs, this process is exemplified by the increasing deployment of private security and military companies alongside state security forces to combat social resistance to destructive extractive projects such as mining, oil and gas drilling, and pipeline expansions (e.g. Granovsky-Larsen and Santos, 2021; Dunlap and Brock, 2022). Consequently, Bichler and Nitzan (2017) argue, the growth of hierarchical power and sabotage are, to a significant degree, self-perpetuating, generating what Ulf Martin (2016) has termed 'autocatalytic sprawl'; a process whereby each new round of hierarchy construction and sabotage generates ever-greater complexity and demand for energy. Importantly, this burgeoning complexity and the increasing energy demand associated with it are, in the aggregate, not the product of some grand capitalist scheme (Bichler and Nitzan, 2017). Indeed, most of the hierarchy construction and sabotage that produces this complexity/energy demand are driven by specific coalitions acting in their (narrowly) perceived interests in specific spatio-temporal contexts (ibid.). Moreover, while many of these power-plays are reactive (e.g. to a perceived threat to a particular corporation/corporate coalition's power), they are additive to a pre-existing complexity; the latter comprising the legacy of previous rounds of hierarchy formation/sabotage and resistance undertaken over time by myriad actors and organisations (ibid.). The above argument is depicted in Figure 3.3 (below).

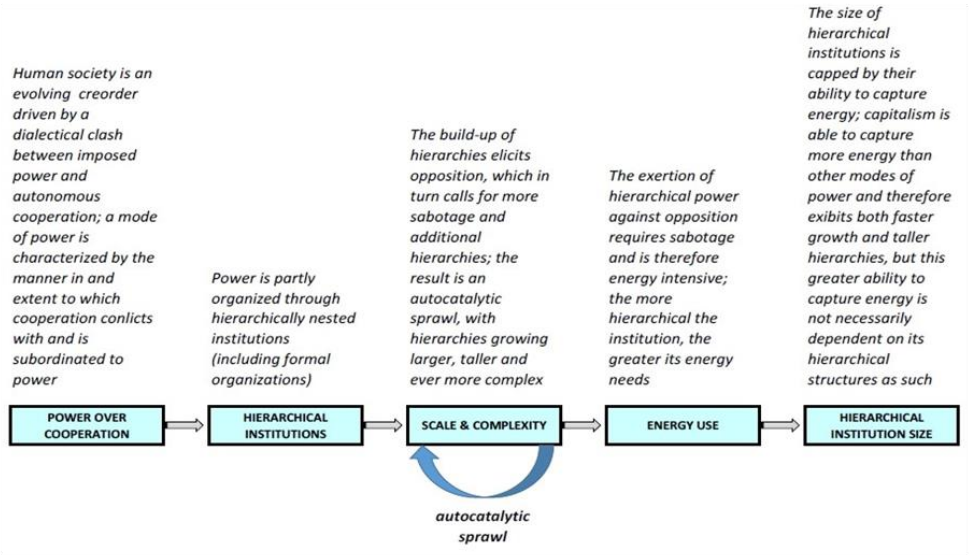


Figure 3.3 From Hierarchical Organisations to Energy Capture
Source: Bichler and Nitzan, 2017: 32

Alongside Di Muzio's (2015) insights on Carbon Capitalism, these arguments provide a constructive conceptual-theoretical bridge between CasP and EDC research/scholarship. Thus, by elucidating the fundamental role of carbon energy in the capitalist mode of power, differential accumulation, hierarchy formation, strategic sabotage, and the conflicts/resistance that result from these interrelated and recurring processes, this energy-focused CasP scholarship provides a platform to undertake the following constructive endeavour: namely, to synthesise CasP's core insights regarding the power underpinnings of capital, the central motivating role of (differential) power in forward-looking (differential) accumulation, and the inherently conflictual nature of the accumulatory struggle with crucial insights from the EDC literature. Indeed, for the purposes of elucidating the political economic drivers/dynamics of EDCs, such a synthesis would usefully retain key insights from EDC literature. First, this CasP-EDC literature synthesis would retain the core understanding (shared by *SMGACEs* and *Marxist explanations* alike) regarding the biophysical foundations of all forms of (political) 'economic' activity; especially regarding the central importance of energy and material flows (e.g. Martinez-Alier and Muradian, 2015). Second, this synthesis would also retain the key insight (similarly shared by *SMGACEs* and *Marxist explanations*) that EDCs are intimately linked with 'growth and changes in the social

metabolism' (e.g. Martinez-Alier et al., 2016: 17). Third, this synthesis would preserve the crucial observation (associated with *Marxist explanations*) that capital accumulation is a *fundamental driver* of socio-metabolic growth/changes and the contested 'socio-metabolic configurations' that give rise to EDCs (e.g. Scheidel et al., 2018). Finally, it would retain the insight that EDCs frequently result from processes of appropriation, dispossession, and cost-shifting, which are intimately linked to capitalist accumulation efforts (e.g. Demaria, 2017). However, by incorporating these valuable insights within a wider CasP/carbon capitalism framework, this synthesis arguably serves to address two specific weaknesses associated with *SMGACEs* and *Marxist explanations*, respectively. Regarding the former, this synthesis addresses the critique that such explanations fail to explain the 'fundamental drivers of ecological overshoot and social crises' (Pirgamier and Steinberger, 2019: 5). Concerning the latter, it arguably addresses many of the power problems associated with *Marxist explanations* (see Section 2.4.2.3).

3.3 Chapter summary and theoretical framework

Focusing specifically on the EDC literature, this chapter has critically explored two broad categories of explanation for the global proliferation of environmental conflicts: *SMGACEs* and *Marxist explanations.* Notwithstanding their important insights, both types of explanation (arguably) contain several blind spots and assumptions that limit their ability to fully elucidate the political economic drivers and dynamics of EDC, particularly regarding the fundamental role of capitalist power. *SMGACEs* correctly identify 'growth and changes in the social metabolism' as a central driver of EDCs (e.g. Martinez-Alier et al., 2016: 17). Relatedly, they also provide the important insight that – owing to the non-recyclability of energy and minimal recyclability of materials – even without growth, industrial economies demand a continual supply of energy and materials from the commodity extraction frontiers; thus, creating the conditions for EDCs (e.g. Martinez-Alier et al., 2010). However, despite regularly identifying the specific social actors driving EDCs (whether governments or corporations), studies employing SMGACEs do not adequately theorise the fundamental *social drivers* of such conflicts (Pirgmaier, 2018; Scheidel, 2023).

Marxist explanations arguably do a better job in this regard, identifying capital(ism) and its accumulatory imperative as a fundamental driver of socio-metabolic growth/changes and concomitant EDCs. *Marxist explanations* also usefully identify appropriation and cost-shifting as key accumulation strategies that frequently provoke EDCs (e.g. Scheidel et al., 2018); with *the world ecology variant (Marxist explanation*) compellingly arguing that the capitalist search for increasingly scarce 'Cheap Nature'– uncommodified energy, raw materials, food, and labour power that can be freely appropriated – also plays a fundamental role (e.g. Schindler and Demaria, 2020). However, despite these valuable contributions, *Marxist explanations* are not without their own problems; many of which can be traced to the foundations of Marxist and (neo)classical political economic thought more broadly. For our purposes, the most important of these foundations is the conceptual separation between 'politics' and 'economics'. Manifesting itself in a bifurcated conceptualisation of accumulation (i.e. 'economic' accumulation versus 'extra-economic' accumulation), this latter assumption arguably stymies the ability of Marxist explanations to fully elucidate the central role of power; both as fundamental driver of and key dynamic within EDCs. Thus, by restricting analyses of power within EDCs to a supposedly 'extra-economic' realm characterised by appropriation and cost-shifting, *Marxist explanations* elide the wider gamut of power relations/dynamics that cannot be reduced to the above concepts. Indeed, in a contemporary capitalist reality where power arguably drives and pervades *all* accumulation, the value of conceptualising accumulation as a bifurcated phenomenon that can take two routes is questionable; undermining *Marxist explanations*' ability to adequately apprehend this power-abundant reality in the specific context of EDCs. At the crux of the problem lies the issue of how best to conceptualise capital(ism) and capital accumulation; and the analytical role of power *therein* (Nitzan and Bichler, 2006, 2009; Bichler and Nitzan, 2012, 2021).

To address this problem of how to theorise the capital-power dialectic in the context of EDCs, I then introduced Nitzan and Bichler's (2009) CasP approach before discussing Di Muzio's (2015) theory of carbon capitalism and other recent attempts to illuminate the energetic underpinnings of capitalist power (e.g. Bichler and Nitzan, 2017). In

doing so, I argued that CasP and carbon capitalism – which both place capital firmly in the realm of the 'political' – could form the basis of an alternative theoretical framework to guide empirical research into the fundamental role of capitalist power; both as a key driver of and key dynamic within EDCs. However, although CasP and carbon capitalism would perform most of the heavy lifting within this framework, the latter could also retain key insights from both *SMGACEs* and *Marxist explanations* outlined above. Therefore, I now distill my literature review (Chapters 2 and 3) into ten key points. Taken together, these ideas comprise the theoretical framework that will guide the forthcoming empirical explorations in Chapter 5:

1. Alongside appropriation, cost-shifting, and the search for 'Cheap Nature', socio-metabolic growth/change constitutes a key driver of EDCs (e.g. Scheidel et al., 2018). However, dominant capital's pursuit of *differential* accumulation, which Nitzan and Bichler (2009) conceptualise as essentially a quest for increased *differential* power, is arguably the most consequential and fundamental driver of these phenomena (Nitzan and Bichler, 2009; Di Muzio, 2015).

2. When it comes to (re)shaping global forms of social reproduction, driving socio-metabolic growth/changes, appropriating uncommodified resources, cost-shifting, and provoking EDCs, the most powerful corporations are those with the highest market capitalisations. Nitzan and Bichler refer to this latter group – and the government organs with which they are intertwined – as dominant capital. While dominant capital does not have clearly defined boundaries, within CasP scholarship the S&P 500 index (which comprises the 500 largest US-based equities by market capitalisation) is typically used as a proxy for this group (Nitzan and Bichler, 2009; Di Muzio, 2015).

3. Differential accumulation = rising *differential* capitalisation relative to an appropriate financial benchmark (e.g. the S&P 500). Capitalisation is a forward-looking process whereby investors capitalise *expected future earnings* discounted to present value for some factor of risk (Nitzan and Bichler, 2009; Di Muzio, 2015). To achieve differential accumulation, a corporation/corporate coalition must shape and reshape social reproduction, reconfigure the social metabolism(s), and strategically sabotage socio-ecological relations in ways that produce at least one of the following three results: increase differential earnings; increase differential hype; reduce differential risk (McMahon, 2022).

4. The inherent uncertainty that characterises the forward-looking process of differential capitalisation/accumulation provides opportunities for environmental justice activists to disrupt the accumulatory process. To be successful in this endeavor, environmental justice activists must exert their own power to impact upon the targeted corporation/corporate coalition in at least one of the following three ways: reduce differential earnings; reduce differential hype; and/or increase differential risk (Nitzan and Bichler, 2009; Cochrane and Monaghan, 2012; McMahon, 2022).

5. Because accumulation is differential, a corporation/corporate coalition's rising differential capitalisation indicates that its power is increasing relative to its peers, while declining differential capitalisation (i.e. differential decumulation) indicates declining power (Nitzan and Bichler, 2009). With due caution, environmental justice activists can use differential capitalisation to gauge the success/failure of their PEDCs against a corporation or corporate coalition. Thus, following a successful PEDC in the context of EDC, a targeted corporation's declining differential capitalisation (i.e. differential decumulation) can, to some degree, be regarded as a partial expression of environmental justice activists' own collective power (Cochrane and Monaghan, 2012).

6. Although production plays a key role in shaping corporate earnings, capitalisation, and state revenues, it is far from the only important factor. Indeed, to fully understand the determinants of these quantities, we must widen our analysis to capture the full spectrum of (qualitative) power processes and struggles (e.g. EDCs) whereby corporations, governments, and a multitude of other actors compete to (re)shape social reproduction and (re)configure social metabolism(s). Thus, capital is not a material-economic entity, but commodified differential power rooted in ownership and represented symbolically in a monetary unit – e.g. dollars, pounds, yen etc. (Nitzan and Bichler, 2009; Di Muzio, 2015).

7. According to Nitzan and Bichler (2009), dominant capital pursues differential accumulation via two broad regimes: 'breadth' and 'depth'; each of which can take two forms: (1) green-field investment growth outpacing that of rivals (external breadth); (2) differential growth via mergers and acquisitions (internal breadth); (3) raising prices faster than rivals (external depth); or (4) cutting costs faster than rivals (internal depth). Of the four regimes, green-field investment growth (external breadth) would appear to be most implicated in EDCs (e.g. the expanding commodity frontiers). However, more research is required to establish the extent to which internal breadth, external depth, and internal depth are implicated in EDCs.

8. Fossil fuels play a fundamental role in maintaining/reproducing the capitalist mode of power (carbon capitalism) and globalised patterns of social reproduction. Thus, more than just a political economic system, carbon capitalism is also a civilisational order (Di Muzio, 2015). This order 'can be conceptualized as an unequal and *transitory* petro-market civilization founded

on fossil fuels as the dominant energy base for a considerable portion of humanity' (ibid: 9).

9. The oil and gas and banking sectors are the two most capitalised (and powerful) sectors of the global political economy. The power of banks to create credit (carbon capitalism's money supply) is ultimately bound by the availability of surplus carbon energy. The more surplus energy available, the greater the banks' power to increase their differential capitalisation (and power) by monetising that energy through credit creation. Similarly, the power of the oil and gas sector is also tied to their ability to monetise/capitalise oil and gas (Di Muzio, 2015).

10. Despite the increasingly grave trajectory of petro-market civilisation, which all the evidence suggests is heading for climate and ecological breakdown, oil and gas capitalists/investors remain intent on 'monetiz[ing]the destruction of the biosphere through the sale and combustion of ever more carbon energy' Di Muzio, 2015: 15).

For the purposes of theoretical-empirical explorations of real-world EDCs, this framework could constitute a useful tool for: (a) elucidating the central role of capitalist power; both as fundamental driver of and key dynamic within EDCs – especially those sparked by (dominant) capital's attempts to accumulate differentially through the extraction and monetisation of oil and gas; and (b) climate and environmental justice activists struggling to thwart (dominant) capital's attempts to 'capitaliz[e] a future unsustainable' (Di Muzio, 2012: 363). In doing so, it could simultaneously contribute towards the Barcelona School of PE's political project of 'explain[ing] conflicts, and empower[ing] political alternatives' (Kallis cited in Demaria, 2017: 29). Empirically exploring EDC using this framework would also enhance the CasP

literature. Firstly, because, as far as this literature is concerned, EDC represents an important albeit hitherto unexplored field of research. Moreover, as I shall explore in Chapter 4, deploying CasP to study EDC provides opportunities to expand CasP's methodological toolkit; principally by combining the ethnographic methods and place-sensitive research (which are ubiquitous in EDC research but remain largely absent from the CasP literature) with some of the desk-based quantitative methods that are a central feature of CasP scholarship. With these arguments and my forthcoming theoretical-empirical exploration of EDC (Chapter 5) in mind, the next chapter introduces a specific type of EDC that has become increasingly prevalent in recent years.

Chapter 4: Methodology

Note: This chapter draws on the following co-authored paper (Lloveras et al., 2021), previously published in Ecological Economics.

Having identified similar weaknesses in the EDC and fracking conflict literatures (see Chapter 2), regarding extant theorisation(s) of the capital-power dialectic, I articulated a CasP-carbon capitalism inspired theoretical framework to better support empirical investigations into such conflicts (Chapter 3). In doing so, I argued that the latter could: (a) help produce novel insights regarding the fundamental role of capitalist power - both as a key driver of and key dynamic within such conflicts; and (b) by elucidating capitalist vulnerabilities, also prove useful for environmental justice activists in their struggles to halt the expansion of socio-ecologically harmful infrastructures. In Chapter 5, I will deploy my CasP-carbon capitalism inspired framework via a theoretical-empirical investigation of the UK fracking conflict.

To pave the way for this investigation, this present chapter will articulate the methodology, ethico-political concerns, and novel research strategy underpinning this research. It will proceed thus: Section 4.1 will offer some ontological, epistemological, and political reflections on this thesis' conceptualisation of social ecological reality and how this intersects with the CasP and carbon capitalism approaches that underpin my theoretical framework. Having argued that social ecological reality is dynamic and processual (Section 4.1.1), I elaborate CasP and carbon capitalism's dominant epistemological-methodological toolkit for elucidating the role of capitalist power in structuring that reality (Section 4.1.2). To expand this toolkit for studying capitalist power and vulnerability in the context of EDC and fracking conflict I synthesise feminist standpoint theory with the extended case method approach (Section 4.1.3). Next, I reflect on the abductive, non-linear nature of (this) research (Section 4.2). Drawing on all the above, I then justify and detail my use of quantitative (Section 4.3) and qualitative (Section 4.4) analyses to elucidate my case study before concluding the chapter (Section 4.5).

4.1 Some ontological, epistemological, and political reflections

4.1.1 CasP and carbon capitalism: a processual ontological interpretation

It is not necessary to fully recapitulate my theoretical framework here. However, for the purposes of elucidating this thesis' ontological, epistemological, and political assumptions, it may be useful to revisit some key ideas from Chapter 3. As discussed previously, this thesis' theoretical framework draws heavily on Nitzan and Bichler's (2009) CasP approach and Di Muzio's (2015) theory of carbon capitalism. However, since these authors (Nitzan and Bichler especially) draw on such an eclectic mix of thinkers and do not explicitly tie their work to any specific philosophy of science, there remains significant scope to articulate which philosophy/ies of science would be compatible with these cognate approaches.

Although other interpretations are possible (e.g. Cochrane, 2015, 2020), this thesis follows recent scholarship in reading CasP through the lens of a processual philosophy of science (Baines and Hager, 2023; Vastenaekels, 2023).[36] Process philosophy (or ontology) is founded on the assumption that since 'reality' is dynamic, this dynamism must be the key focus of any philosophical attempt(s) to comprehend that reality (e.g. Rescher, 2000; Renault, 2016). Therefore, rather than focusing on things or objects, process ontology priorities processes, defined by Rescher as

> a coordinated group of changes in the complexion of reality, an organized family of occurrences that are systematically linked to one another either causally or functionally…A process consists in an integrated series of connected developments unfolding in conjoint coordination in line with a definite program. Processes are correlated with occurrences or events: Processes involve various events, and events exist only in and through processes. Processes develop over time. Even as there can be no instantaneous wail or drought, so there is no such thing as an instantaneous process…And processes almost inevitably involve not just perdurance and continuity but also change over time (1996: 38).

Such an understanding of process – characterised especially by the simultaneous co-presence of perdurance, continuity, and change – can be discerned within Nitzan and

[36] Cochrane (2015, 2020) has fruitfully synthesised CasP with actor network theory.

Bichler's (2009) concept of the capitalist creorder (i.e. creation of order). Thus, rather than being immutable or constantly changing beyond recognition, the capitalist creorder is characterised by 'the paradoxical fusion of being and becoming, state and process, stasis and dynamism' (ibid.: 18). Here, it is worth recalling Nitzan and Bichler's (2009, 2023) arguments regarding the central role of capitalisation – conceptualised as the 'algorithm' or 'operational symbol' of the capitalist creorder – in rendering capitalist reality.[37] For while capitalisation constitutes 'the totalizing power institution that defines and perpetuates' capitalist reality, it can simultaneously be understood as 'the logic that tells capitalists what their interests are and then forces them to impose those interests on society [and nature]' (Bichler and Nitzan, 2023: 115). Consequently, the capitalist creorder is dynamically reproduced via the continuous deployment of capitalist power, against opposition, to (re)shape social reproduction – and the social metabolism (e.g. Martinez-Alier et al., 2010) in ways conducive to the augmentation of such power (Nitzan and Bichler, 2009). However, because power is relative, rather than capitalisation per se, what capitalists are most concerned with is their differential accumulation, defined as increasing differential capitalisation through time (ibid.). As Nitzan and Bichler explain:

> the goal is not merely to retain one's relative capitalization but to increase it. And since relative capitalization represents power, increases in relative capitalization represent the augmentation of power. The accumulation of capital and the changing power of capitalists to transform society become two sides of the same creorder (ibid.: 308).

Di Muzio's crucial ontological contribution is to synthesise these CasP insights with a broader understanding of 'the importance of energy as an ontological category' that should be integral to any analysis of contemporary capitalist power (Creorder, 2010: 27min 58). This ontological contribution underpins Di Muzio's (2015) theory of carbon capitalism which, alongside CasP, plays a key role in my theoretical framework. Having outlined this thesis' core ontological assumptions, I will now explore CasP/carbon

[37] Bichler and Nitzan (2023) borrow the operational symbol argument from Ulf Martin (2019), who distinguishes between three kinds of symbols: (1) Magical symbols (which are identical to the symbolised 'reality'); (2) Ontological symbols (which are distinct from symbolised 'reality'); and (3) Operational symbols, which generate/render the very 'reality' being symbolised.

capitalism's existing epistemological-methodological toolkit before articulating how I propose to expand this toolkit for studying EDC and fracking conflict.

4.1.2 CasP/carbon capitalism's existing epistemological-methodological toolkit

A key contribution of CasP (which carbon capitalism draws upon) is to demonstrate the epistemological value of seeking to analyse capital(ism) and differential accumulation 'from above' (Nitzan and Bichler, 2009: 30); that is, from the vantagepoint of dominant capital (ibid.). It is from this vantagepoint that Nitzan and Bichler argue the conventional separation of 'politics' and 'economics' is a 'pseudofact', which 'is not at all what capitalism looks like from above' (ibid.). Most CasP and carbon capitalism research is undertaken using desk-based research methods. Generally, this comprises lots of quantitative analysis, principally focusing on differential accumulation within dominant capital. To illuminate the shifting power distributions expressed through their quantitative findings, CasP researchers typically undertake further desk-based research; this time using qualitative methods (e.g. Nitzan and Bichler, 2009; Baines, 2013; Cochrane, 2015; Hager, 2016; McMahon, 2022). However, while this top-down desk-based approach has yielded myriad insights, there arguably remains significant scope to extend CasP and carbon capitalism's epistemological-methodological toolkit; especially for elucidating 'the quantities and qualities of capitalist power' – and vulnerability – in the context of EDC and fracking conflict (ibid.). Here, it is worth considering Cochrane's (2015) argument that the analytical function of power in CasP analysis is not to provide explanations for socio-ecological happenings. Rather, CasP's core epistemological contribution is to illuminate the dynamically changing (quantitative) power distributions within the capitalist class of owners, which must subsequently be explained through careful (qualitative) research (ibid.). However, given the myriad social ecological relations and processes that are capitalised by diverse capitalist interests, and the billions of lives impacted by intra-capitalist struggles to shape social reproduction, the scope for such research is vast.

More specifically, in the context of EDC and fracking conflict, where environmental justice activists contest capitalist power directly, there would appear to be ample

opportunities for qualitative explorations of capitalist power and vulnerability. Notwithstanding the tendency towards problematic theorisations of capitalist power, the EDC and fracking conflict literatures have already yielded important insights through qualitative field-based research methods (e.g. Gerber et al., 2009; Demaria and Schindler, 2016; Vandevoorde, 2022). These insights suggest the potential for synthesising such a bottom-up (qualitative) fieldwork-based research strategy with CasP and carbon capitalism's more top-down approach that seeks to understand capitalist power from the vantagepoint of (dominant) capital. Within the CasP literature, this potential is also suggested by Cochrane and Monaghan's (2012) activist orientated reading of CasP, which explores how social justice activists can successfully contest capitalist power via political economic disruption campaigns (PEDCs), thus intervening in the accumulatory process. However, while Cochrane and Monaghan illustrate how social justice activists can/do successfully contest capitalist power, their three example case studies are, nevertheless, still derived from desk-based research.

4.1.3 Expanding CasP and carbon capitalism's epistemological-methodological toolkit for exploring EDC and fracking conflict

The project of expanding CasP and carbon capitalism's epistemological-methodological toolkit for elucidating capitalist power and vulnerability in EDC and fracking conflict could take numerous paths. The path chosen in this thesis is to undertake such expansion with the aid of feminist standpoint theory (e.g. Harding, 2004) and the extended case method (Burawoy, 2009). I will deal with each in turn.

4.1.3.1 Feminist standpoint theory

According to Harding (2015: 31), feminist standpoint theory (FST) can be understood as being 'simultaneously a methodology, an epistemology, a philosophy of science, and a sociology of knowledge'. FST rejects both the value-free ideal of positivist science and the relativism of postmodernism (ibid.). Not only does FST regard all research to be political; but more controversially (Hammersley, 2005), it also contends that research explicitly motivated by political values and goals can provide more accurate depictions of reality than those which are not (Harding, 2015). FST has been criticised for compromising researcher objectivity (Huddle, 2011). However, implicit in such

criticism is a post-positivist understanding of objectivity which views politics and values as having no place in the research process (Douglas, 2004). However, neutrality and objectivity are not the same thing. Indeed, attempting to remain neutral can hinder more objective (i.e. truer) accounts of reality by foreclosing critical interrogation of dominant power relations (Harding, 1993, 2015). In this regard, FST's 'logic of enquiry' is founded upon a recognition of contemporary science's (both natural and social) deep entanglement with

> social and political policies, and practices, and especially those promoted by corporations, militaries, and nationalisms—by the most powerful forces within states and around the globe (Harding, 2019: 179-180).

Consequently, while the values underpinning – and interests served by – scientific research may not always be stated explicitly, this does not mean it is free of such interests and values (ibid.). Moreover, regardless of scientists' good intentions, when most research projects are funded by governments and corporations it is hardly surprising that such projects 'tend to align with the values and interests of those powerful institutions' rather than 'with [those of] democratic social movements' (ibid.).

Pushing back against this tendency, FST 'strong objectivity' proposal involves a logic of enquiry that begins research from the lives of oppressed groups and social movements. That is, those groups that are disproportionately disadvantaged/harmed by unequal and unjust social relations (Harding, 2015). For it is argued that doing so can provide better insights into reality than starting research from the lives of the powerful (Harding, 1993). However, there is far more to identifying 'standpoint insights' than merely documenting the words or beliefs of oppressed groups. For oppressed groups are not immune from believing and reproducing the distortions/misrepresentations of social reality that pervade elite discourse (Harding, 2015). Consequently, it is important to 'study up' from the lives of oppressed groups 'to map the practices of power' through which 'dominant institutions and their conceptual frameworks create and maintain oppressive social relations' (Harding, 2004: 31). This is achieved by 'locating, in a material and political disadvantage or form

of oppression, a distinctive insight about how a hierarchical social structure works' (ibid.). Thus, while FST enquiries frequently involve ethnographic-type methods (e.g. participant observation), the injunction to 'study up' distinguishes such enquiries from conventional ethnographies that remain narrowly focused on the lifeworld(s) of research participants. Thus, rather than being the object/subject of enquiry, the lives and experiences of marginalised groups are starting points for broader enquiries into social ecological power relations. While FST is influenced by Marx's attempts to elucidate capitalist oppression from the standpoint of the proletariat, a key motivator of the standpoint project has been to move beyond capital-labour relations to elucidate the unequal social relations implicated in other forms of oppression. For example, FST has been mobilised to explore inequalities and oppressive social relations from the standpoints of: African American women in the US (e.g. Collins, 1997); working class women in South West Virginia (Seitz, 1998); gay men in Canada (O'Neill, 2002); trans people in the US (Jones, 2020); and Zimbabwean women migrants in Britain (Chikwira, 2021). Although FST has been criticised for essentialising individual perspectives within marginalised groups, Collins (1997) contends that the principal objective of FST is to elucidate the relative power of different social groups (e.g. South Asian British women relative to White British men). Given this attentiveness 'to the role of power and its impact on various social groups' (Stapleton: 2020: 3), FST emerges as a potentially useful epistemological-methodological tool for elucidating capitalist power and vulnerability in the context of EDC and fracking conflict.

4.1.3.2 The extended case method and reflexive science

Michael Burawoy's (1998, 2009) extended case method (ECM) also informs this thesis' extension of CasP/carbon capitalism's epistemological-methodological toolkit for studying EDC and fracking conflict. The ECM is a methodological approach that 'deploys participant observation to locate everyday life in its extralocal and historical context'. Much like Harding's FST, which 'works the terrain between androcentric science and a postmodern dismissal of science', the ECM is epistemologically 'ground[ed] in an alternative conception of science', (Burawoy, 2009: 280). Burawoy terms this alternative *reflective science*, which he contrasts with its more dominant

counterpart: *positive science* (Burawoy, 1998, 2009). Following Marin-Burgos' (2014) interpretation, Burawoy's (1998, 2009) reflexive science is arguably founded upon two key assumptions:

1. Processes within the research site(s) being investigated and the broader processes/context in which they are embedded are mutually determined.
2. The researcher's positionality is consequential for both analysis and findings.

Here, positionality refers to the researcher's biography and embodiment (e.g. gender, race, age, education, class, origins, and how these position the researcher in relation to research participants). The term positionality also encapsulates the researcher's standpoint regarding how they approach the research (Marin-Burgos, 2014; Burawoy, 2009).

In contrast to *positive science*, which requires researchers to distance themselves from their object(s) of study, Burawoy's (1998, 2009) reflexive science is founded on the assumption of intersubjectivity and continual dialogue between scientists and their study subjects. To elucidate *reflexive science* and the ECM that endeavours to realise it, Burawoy contrasts these with *positive science* and its archetypal (social research) method: survey research. The differences between these two models of science are expressed in Table 4.1, which also illuminates their respective flaws. Positive science forbids reactivity while simultaneously valorising 'reliability, replicability, and representativeness' (ibid.). Positive science's limits can be found in the gap between these principles and unavoidable *context effects* (i.e. interview effects, respondent effects, field effects, and situational effects), which cause survey research to transgress these principles. For Burrawoy, these context effects stem from the interview's embeddedness in a broader terrain of social relations, and from the inseverable relationship between interviewer and interviewee.

Table 4.1 Positive Science & Survey Research vs Reflexive Science & the Extended Case Method (and ideals-practice gaps)

Positive Science			**Reflexive Science**		
Positive Principles	***Survey Research Method***	***Context effects*** *(that create a gap between model's principles and chosen method)*	***Reflexive Principles***	***Extended Case Method***	***Power Effects*** *(that create a gap between model's principles and chosen method)*
Reactivity proscribed: Researcher endeavours not to affect the phenomena being investigated.	Stimulus/response	**Interview effects:** Responses influenced by positionality/characteristics of the researcher, the interview schedule, and the spatio-temporal context/conditions in which interview occurs.	**Intervention:** By moving with research participants in their time and space, and engaging them in intersubjective dialogue, the researcher intervenes in the social world.	Extension of observer to participant	**Domination:** Intervention implicates the researcher and participants in power relations, which change throughout the research process. Sometimes participants dominate. Other times the researcher does. This shapes the research process and its results.
Reliability: Data collection driven by pre-defined criteria.	Standardisation	**Respondent effects:** Respondents' interpretation of questions influenced by world view/life experiences	**Process:** The researcher aggregates situational knowledge into social processes.	Extension of observations over time and space	**Silencing:** This aggregation inevitably results in some voices/perspectives being excluded/marginalised/silenced while others are elevated/prioritised.
Replicability: Codes of data selection/analysis must be standardised unambiguously, thus enabling other researchers investigating the same phenomenon to reproduce same results	Stabilisation of conditions	**Field effects:** Responses influenced by socio-political-economic context in which interview occurs.	**Structuration:** The researcher moves beyond social processes observed in the field to delineate the broader social forces that impinge upon the locale being studied.	Extension from process to force	**Objectification:** The elision of complex social processes that cannot be observed and the reification of social forces as external and natural.
Representativeness: Ensure the portion of the world being investigated is 'typical of the whole'	Sample population	**Situation effects:** The attitudes, meanings, and knowledge derived from the social context being studied are specific to that context.	**Reconstruction:** The researcher deploys the case study's specificities to develop theory.	Extension of theory	**Normalisation:** The complexity of reality is reduced to categories of investigation, while the fieldwork site is reduced to a 'case study'.

Sources: Burrawoy, 2009: 63; Marin-Burgos, 2014: 32

Founded on the 'irrevocable gap between positive principles and its practice' (Burawoy, 1998: 11), reflexive science embraces 'intervention, process, structuration, and theory reconstruction' (Burawoy, 1998: 4). However, just as survey research violates its own principles of positive science, ECM's pursuit of reflexive science is also limited by its corresponding 'power effects' (domination, silencing, objectification, and normalisation). However, while these 'power effects' are ever-present, Burawoy (2009) argues that, by rendering them visible through self-critical reflexivity, researchers can better understand and contain (but not fully eliminate) them. In doing so, the ECM can be mobilised to harness it epistemological potential, which lies in its ability to generate knowledge through the progressive improvement of existing theory. As Burawoy explains,

> The goal of research is not directed at establishing a definitive 'truth' about an external world but at the continual improvement of existing theory. Theory and research are inextricable…The weight of evaluation lies with the product, whether reconstruction pushes theory forward or merely makes it more complex, whether reconstruction leads to more parsimonious theories with greater empirical content, whether reconstruction leads to the discovery of new and surprising facts (Burawoy, 1998: 28).

4.1.3.3 Synthesising my theoretical framework with FST and the ECM

Synthesising the above, my theoretical-empirical exploration of capitalist power and vulnerability in the context of the UK fracking conflict drew upon FST, the ECM and its principles of reflexive science. Therefore, aided by my CasP and carbon capitalism driven theoretical framework, following FST I 'studied up' (Harding, 2015) from the experiences of UK anti-fracking activists to explore capitalist power and vulnerability in the context of the UK fracking conflict. Making no pretentions towards faux neutrality, this process pursued 'strong objectivity' through an 'epistemic accountability to the real' (Kukla, 2008: 285). However, following Burawoy's (1998) ECM/reflexive science, this pursuit was underpinned by an understanding that while absolute 'truth' is unattainable, it is nevertheless possible to enhance knowledge. Not in any final sense, but rather through 'the progressive reconstruction of theory' (ibid.: 5). Thus, while the knowledge produced in this thesis is grounded in the empirical data, the research

problem, questions, and analysis are both informed and shaped by existing theory and the ontological-epistemological assumptions outlined above.

4.2 A note on the abductive non-linear nature of (this) research

It is important to note that, like much social scientific research, this project proceeded in a highly iterative and non-linear manner. When I began my fieldwork in March 2018, I did so with the intention of drawing upon and contributing to the EDC and fracking conflict literatures. Following FST, I also planned to study up from the lives of UK anti-fracking activists to 'map the practices of power' that both generate and shape EDC and fracking conflict (Harding, 2004: 31), while simultaneously drawing on the dialogical and reflexive approach associated with the ECM (e.g. Burawoy, 1998). This tentative research plan was driven by my theoretical interest in the political economy of EDC/fracking conflict and a desire to undertake research aligned with the concerns of environmental justice activists. However, I had yet to discover the CasP and carbon capitalism literatures that underpin my research aim, questions, and theoretical framework. Indeed, I only discovered these literatures after completing my fieldwork, albeit while still mid-way through data collection.[38] This arguably reflects the messy, broadly abductive, nature of most qualitative case study research whereby, rather than a linear process of distinct phases, the various activities comprising the research process (data collection, data analysis, theorising, writing-up etc.) are unavoidably intertwined (Dubois and Gadde, 2002). Consequently, 'by constantly going "back and forth" from one type of research activity to another and between empirical observations and theory', as the research progressed, my comprehension of both the empirical context and the theories that might elucidate it expanded (ibid.: 555). While this iterative process took me down numerous cul-de-sacs, it also enabled me to refine my research aim, questions, theoretical framework, data analysis, and writing up.

[38] While I completed my fieldwork in November 2019, this was not the end of my data collection. I formally completed my qualitative data collection in the first half of 2021.

4.3 The quantities

> Capitalists constantly try to force life into a box, to harness creativity, to convert quality into quantity. This is the nature of their power. But they can achieve this conversion only speculatively and inter-subjectively, and there is no point in pretending otherwise. The task is to try to understand this speculative translation. And, in our opinion, the only way to do so is by telling a 'scientific story' – a systematic historical analysis that convincingly ties the quantities and qualities of capitalist power (Nitzan and Bichler, 2009: 313).

As noted above, my discovery of the cognate CasP (e.g. Nitzan and Bichler, 2009) and carbon capitalism (e.g. Di Muzio, 2015) approaches that underpin my theoretical framework came relatively late in the research process. Although it took me several weeks to digest their core arguments (especially those of CasP), it soon became apparent that these approaches could illuminate my emerging qualitative findings, thus contributing important insights to the EDC and fracking conflict literatures. As argued in Chapter 3, a key contribution of CasP is to theorise differential capitalisation as a (static) quantitative expression of the distribution of power amongst capitalists; and differential accumulation/decumulation (i.e. rising/falling differential capitalisation) as a dynamic expression of shifting power distributions amongst capitalists (Nitzan and Bichler, 2009). I also discussed Cochrane and Monaghan's (2012) activist orientated CasP analysis. The latter elucidates how the (non-capitalist) power of social justice activists, exercised through political economic disruption campaigns (PEDCs) comprising diverse tactics, can also influence differential capitalisation, sometimes even precipitating periods of differential decumulation for their corporate adversaries. Having read Cochrane and Monaghan's work, it became apparent that analysing the differential accumulation/decumulation of key fracking companies could illuminate my empirical (qualitative) data concerning the power struggles that comprised the UK fracking conflict between 2010 and 2020. Especially given my emerging finding that UK anti-fracking activists took a keen interest in fracking companies' market values and share prices. Thus, although activists did not analyse relative/differential values (as per CasP), they did draw upon these absolute values to gauge their ongoing success in increasing investors' risk perceptions regarding the financial viability of UK fracking. Consequently, while I had not

anticipated doing so, I decided to undertake a small amount of quantitative differential accumulation analysis of key fracking companies to support – and focus – my ongoing qualitative data collection and analysis.

With no prior training in this type of differential accumulation analysis (and only basic training in quantitative methods), undertaking this analysis involved a steep learning curve. However, following extensive dialogue with more experienced CasP researchers, both via email and the online CasP forum, I eventually managed to access the relevant data and analyse the differential accumulation/decumulation of two key fracking companies spanning the period January 2010-December 2020 (the period covered by my study). As my quantitative differential accumulation analysis unfolded in dialogue with my ongoing qualitative data collection and analysis, I was inspired to undertake further quantitative analysis to support my emerging arguments and findings. This included quantitative exploration of data concerning: UK public support for/opposition to fracking; onshore wind planning applications and new onshore wind sites in the UK. I decided to analyse UK public opinion on fracking data after discovering, via my qualitative data analysis, that both the pro and anti-fracking coalitions regarded winning the battle for public opinion as a key strategic objective. My quantitative analysis of new onshore wind planning applications and sites in the UK was informed by my emerging findings regarding the UK government's sabotaging of the sector, while simultaneously acting to boost onshore fracking (Mathiesen, 2014; Stanton, 2021). Collectively, this supplementary quantitative analysis was undertaken to support, and focus, my qualitative data collection/analysis while achieving the overall research aim and answering my research questions. Therefore, following Burawoy (1998: 15) it might be argued that my deployment of quantitative 'positive methods' as 'handmaidens of reflexive science' enabled me to elucidate broader social forces/processes that both impinged upon and were influenced by the processes observed within the field.

4.4 The (diverse) qualities

> CasP makes the quantities of differential accumulation meaningful. They map redistributions of power. However, those redistributions are actualized qualitatively. There are no determinant, necessary qualities that are expressed by the quantities of accumulation. As such, there are no a priori pathways for political economic analysis…[CasP explorations] can – and must – go anywhere and everywhere to understand the qualities from which the quantities of accumulation emerge (Cochrane, 2015: 62).

Following Cochrane's (2015: 62) advice that CasP explorations 'can – and must – go anywhere and everywhere to understand the qualities from which the quantities of accumulation emerge, the forthcoming analysis in Chapter 5 draws upon a diverse range of qualitative data sources. These include: fieldnotes and diary entries from fieldwork activities; 31 semi-structured interviews with UK anti-fracking activists; photographs taken during fieldwork; artifacts collected from the field (e.g. copies of injunction documents served by fracking companies against anti-fracking activists); and an extensive range of archival and documentary data from online sources (e.g. fracking company and government websites, reports, and press releases; anti-fracking websites; newspapers and news websites; online blogs; social media, investor web forums; and the financial press). In dialogue with my theoretical framework, this extremely rich and diverse data set enabled me to elucidate (albeit partially) the myriad qualities of capitalist power and vulnerability in the context of the UK fracking conflict; and their relationship with the specific quantities discussed above.

4.4.1 An anti-fracking standpoint

Like any research project, data collection for this PhD thesis had to begin somewhere. Guided by FST (I had yet to discover CasP and carbon capitalism), my qualitative data collection strategy began with the struggles and concerns of UK anti-fracking activists; not to remain there, but to 'study up' for the purposes of 'map[ping] the practices of power' that both generate and shape EDC and fracking conflict (Harding, 2004: 31). This strategy, which was also influenced by Burawoy's (2009) ECM, was initially operationalised through extended fieldwork conducted between March 2018 and November 2019. Most of this fieldwork involved participant observation with anti-fracking activists in Lancashire, principally, though not exclusively, in the vicinity of

Cuadrilla's shale gas exploration site at Preston New Road (PNR), where activists were mobilising against fracking. Since I lived just over an hour's train and bus ride away from PNR, I did not reside there as per a traditional ethnography. Neither did I go there every day. Some weeks I would attend four or five days in a row, other weeks fewer. March-December 2018 was the most intensive phase of fieldwork when I generally attended PNR weekly. The period January-December 2019 my attendance at PNR was more intermittent. This change was largely related to the process of 'studying up' from the lives of anti-fracking activists to 'map the practices of power' that generate/shape EDC and fracking conflict (Harding, 2004: 31). For this process involved more documentary and archival data collection (online) and the occasional field visit to an arena of capitalist power (e.g. Manchester commercial and property courts; or a pro-fracking conference attended by oil and gas CEOs and politicians).

4.4.1.1 Participant observation

In line with my research ethics approval, which stipulated that I avoid engaging in any 'illegal' protest activities (many activists had been arrested for engaging in various forms of non-violent direct action), this participation involved: helping prepare food in 'the kitchen tent' on one of PNR's anti-fracking camps during the 'United Resistance', a three-month campaign spanning April-June 2018 that sought to intensify efforts to disrupt Cuadrilla's drilling activities at PNR (Topple, 2018); recruiting a Spanish anti-fracking group to visit PNR for 'International Week' of the United Resistance (Fractura Hidráulica No, 2018); covering shifts on 'gate camp', a 24-hour monitoring post where activists logged all lorry movements and perceptible drilling/fracking activities on Cuadrilla's PNR site (Hayhurst, 2019a); helping to coordinate a campaign to lobby Lancashire MPs and councillors to oppose UK government proposals to centralise fracking planning powers (Fossil Free UK, 2019).

Epistemologically, this participation was important for several reasons. Firstly, because it helped me to gain the trust of anti-fracking activists, thus facilitating 'access' to their ongoing struggles. If I had attempted to 'research' anti-fracking activists without contributing anything to their campaign, it is doubtful whether I would have gained activists' trust to the degree that I did. Indeed, without such participation it would

arguably have been much more difficult to generate the requisite goodwill to encourage people to participate in my research. However, the dialogical process of participant observation (Burawoy, 2009) was also important as a technique for accessing the unique insights of UK anti-fracking activists regarding the actors, institutions, and 'practices of power' that generate and shape EDC and fracking conflict (Harding, 2004: 31). However, beyond narrow epistemological concerns, I also had a genuine desire to contribute positively to the anti-fracking campaign through my fieldwork. This is captured by the following fragment from my research diary where I reflect on my attendance at a planning meeting for the United Resistance campaign:

> *On Wednesday evening I attended a planning meeting for the United Resistance. During this meeting, I learned of plans for week seven of the United Resistance to be themed 'Uniting the Roses Week'. This would involve Yorkshire-based anti-fracking activists spending the week at PNR in solidarity with Lancashire-based activists. On hearing of these plans (and the need to encourage as many people as possible to attend), I offered to invite some sustainability and ecological economics academics I knew from Leeds University (which is in West Yorkshire). Like my offer to use my Spanish skills to invite Spanish anti-fracking activist to PNR, this was my idea. My eagerness to help cannot simply be attributed to my desire to gain trust and make people more willing to cooperate with my research. Yes, that is undoubtedly a key motivation!!! However, my research is also motivated by a strong conviction that fracking is short-sighted, harmful, and reflective of a system that is undermining the ecological conditions that support life on earth. Consequently, while my offers to contribute to the United Resistance are undoubtedly driven in large part by narrow research imperatives, that research is broadly aligned with the ethical orientation and goals of the UK anti-fracking movement* (Diary extract).

However, while these overlapping motivations were not incompatible, they frequently sat in tension with one another. As illustrated by the following research diary extract, this tension was a source of anxiety:

> *While I support the anti-fracking movement and want it to succeed, my research role does separate me from regular activists and, to a certain extent, means that my interests and concerns are not 100% aligned with theirs. Thus, although I want my research to give voice to those fighting fracking, the diversity of the movement and the silencing effect of research inevitably means elevating some anti-fracking voices over others. Similarly, although I want my research to help the anti-fracking/environmental justice cause, I am worried that my analysis could cause inadvertent harm* (Diary extract).

However, keeping these anxieties at the forefront of my mind, and being mindful of the power effects of reflexive science identified by Burawoy (1998), helped me to navigate the fieldwork and research process in a reflexive manner. Through this reflexive strategy, I endeavoured to generate knowledge that, on balance, would be more beneficial (than detrimental) to the cause(s) of environmental and climate justice. This imperative crucially informed my decision to investigate capitalist power and vulnerability (rather than the organisational lifeworld of anti-fracking activists) in the context of fracking conflict. However, I will leave it to others to judge whether I have been successful in my efforts to minimise harm while producing knowledge that furthers the cause of climate and environmental justice.

Since I regularly encountered anti-fracking activists from other parts of the UK (and sometimes other countries) at PNR, who came to support and show solidarity with Lancashire-based activists, this helped me gain diverse insights while contextualising the PNR struggle within its broader national and international context. Similarly, I also attended anti-fracking protests in other parts of the UK (e.g. at IGas' Tinker Lane site in Nottinghamshire). Data collection in the field involved regular note taking concerning my observations and emerging ideas. I also kept a reflective research diary to record my ongoing internal dialogue between myself, my research participants, the data, and academic literature.

While both interesting and enjoyable, undertaking participant observation in this conflictual context was psychologically draining and frequently fraught with ethical, professional, and personal dilemmas (Ellefsen, 2017; McCurdy and Uldam, 2014; Imray

Papineau, 2023). Throughout my fieldwork, questions surrounding the extent to which I should, or should not, participate in anti-fracking activism was a key source of these dilemmas. This is underscored by the following extract from my research diary:

> When I arrived at 'the gates' around 25-30 activists were congregating outside (and thus blocking) the entrance to Cuadrilla's site while a handful of police officers looked on. Although I knew several of them, I was somewhat reticent to go and talk with these activists at first, due to my anxieties about getting arrested. A key condition of my ethical approval to conduct fieldwork was that I refrain from engaging in any activities that might risk me getting arrested (thus bringing the university into disrepute). However, since the police were not yet instructing - or physically forcing - these activists to move, I felt it was safe enough to go and speak with them. The activists I spoke with were in good spirits as they recounted their morning's successes disrupting Cuadrilla's deliveries. Although the atmosphere was jovial, I was very conscious that things could turn very quickly. After ten minutes or so my anxiety levels increased when I noticed that two police officers had started filming us from the opposite side of the road. Something was about to go down. This became even more apparent when the 'friendly', intelligence gathering, police (liaison) officers in blue bibs began to vacate the area (as they always do when confrontation and violence are afoot). Moments later, dozens of (much less friendly) police officers in yellow jackets began pouring out of the OSU (Operational Support Unit) vans, which were parked further down the road. They began forming a line behind us. Looking over my right shoulder, I saw the reason for their sudden presence: a large water tanker was slowly making its way towards us from the well pad. As they had done many times before, the police were preparing to move activists out of the way to facilitate the exit of yet another delivery vehicle from Cuadrilla's site. Conscious that the atmosphere had shifted, I took a few steps to the side (away from the crowd) while the activists I'd been talking to locked arms in preparation to peacefully resist the police's attempts to move them. A few moments later, the police began pushing, shoving, and dragging activists away from the

entrance towards the pavement on the opposite side of the road. Although I felt incredibly torn in this moment (as part of me wanted to lock arms in solidarity with the activists), I decided for the good of my research to remove myself from this situation. However, no sooner had I crossed the road to the 'safety' of the pavement, I was surrounded by a chaotic throng of police officers and the activists they were pushing, shoving, and dragging onto the pavement. Some officers were undertaking this task more aggressively than others. For example, right next to me, I witnessed one officer drag a young male activist beyond the pavement into the hedge, before kicking him in the back and calling him a 'fucking prick'. 'He kicked me and called me a prick', the activists shouted in protest. 'No, I didn't', yelled the police officer, aggressively. 'Yes, you did', I blurted out without thinking. 'You're a liar', the police officer shouted, moving towards me aggressively. 'On no', I thought (or something to that effect!). 'He's going to either arrest me, hit me, or both!' The next moment, the activist who had just been kicked, shouted in the direction of the (more) aggressive officer's colleagues 'Get him out of here. He's out of control'. Luckily for me (and my ethical approval!), these words seemed to have an impact on the officer in question. Suddenly he stopped in his tracks, before turning away and heading towards his colleagues, who were now making their way back to their van having successfully facilitated the water tanker's exit. 'Phew', I thought. 'That was a close one!' From now on, I need to be more careful!'.

While I knew that conducting participation observation within an EDC would be difficult (especially given the conditions of my ethical approval), this example highlights some of the ethical dilemmas and challenges this involved. Being a participant observer is relatively easy when you are drinking tea at the side of the road or holding a placard. However, when the people you've been drinking tea with are locking arms and peacefully resisting police aggression, participation becomes more difficult as does keeping one's cool in the face of such aggression. Thankfully, despite witnessing numerous instances of injustice and police aggression during my fieldwork, I managed to get through this period without doing anything rash, losing my cool, or being arrested.

4.4.1.2 Semi-structured interviews

During my fieldwork, I also conducted 31 semi-structured interviews with UK anti-fracking activists. Although I encountered most of these activists at PNR, not all of them were Lancashire-based. Many had travelled from other parts of the country to show solidarity (e.g. Scotland, Wales, Yorkshire, Sussex, London, Bristol) and two of my interviewees resided outside of UK (in Australia and Spain). This geographical diversity was epistemologically advantageous, because it enabled me to gain insights into experiences, events, and processes unfolding both within and across different parts of the UK and beyond. Since many of the activists I interviewed had been fighting fracking for several years (some since 2011), I was able to draw upon their deep historical knowledge of the conflict and the powerful, yet vulnerable, vested interests they were up against. Although I had developed an interview protocol at the beginning of the research process, this was continuously revised as my fieldwork unfolded and new questions arose out of my ongoing dialogue with participants and the literature (e.g. Burawoy, 1998). It is important to note that this fieldwork was undertaken in a context of increasing criminalisation of anti-fracking activism in the UK. Thus, with many interviewees keen to remain anonymous, I gave them the option to decide how much demographic information, if any, would be published (see Appendix B). Other forms of field data I collected included photographs of anti-fracking protests and the extensive, often violent, policing of those protests. I also collected a range of artifacts from the field. These included anti-fracking leaflets, flyers, posters, and copies of injunction documents served by Cuadrilla's lawyers to anti-fracking protesters at PNR.

4.4.2 Studying up

Importantly, however, following my strategy of 'studying up' from the lives of UK anti-fracking activists, my fieldwork was not solely confined to anti-fracking protests, and my data collection efforts extended way beyond fieldwork. For example, my fieldwork also took me to Manchester Property Courts to learn how some (fracking) capitalists deploy the legal system to curtail the protest rights of the activists who oppose them. I also attended a pro-fracking seminar in London titled 'Unconventional oil and gas market in the UK – planning changes, environmental regulation and tackling the scale-

up challenges' (Westminster Energy, Environment & Transport Forum, 2019: 1). This seminar, which was attended by politicians and included keynote speeches from key fracking company CEOs, formed part of a wider pro-fracking coalition lobbying drive to change planning and environmental regulations for the purposes of accelerating and 'scaling-up' UK fracking (ibid.).

4.4.2.1 Leaving the field (to study up some more)

Typically, methodological texts on ethnography typically contain a section that considers the necessary but often painful process of 'leaving the field' (e.g. Hammersley and Atkinson, 2002: 94). I potentially continued my fieldwork longer than was epistemologically necessary, due to the relationships and attachments formed during this period. However, in November 2019 the UK government brought my fieldwork to a natural conclusion when, following a series of fracking-induced earth tremors at PNR, they imposed an indefinite moratorium on UK (shale gas) fracking (UK Government, 2019). Consequently, rather than a protest or planning meeting my final act of participant observation at PNR was to attend a party celebrating the demise of UK fracking. Leaving the field enabled me to (re)focus my studying strategy on the wealth of UK fracking conflict data available online.

4.4.2.2 Studying up through the world wide web

Beyond fieldwork, my 'studying up' strategy also relied heavily on the collection of a wide range of documentary and archival data, principally from online sources. These online data collection efforts benefitted from: (a) the UK fracking conflict being a national controversy, which received significant amounts of national and international media attention; and (b) the fact that much of the conflict unfolded in online spaces. Although considerable efforts were made to secure interviews with pro-fracking actors, these efforts were ultimately unsuccessful. Following my discovery of CasP and carbon capitalism (and the subsequent refining of my research aim, questions, and theoretical framework), this 'studying up' strategy became more analytically focused on elucidating capitalist power and vulnerability in the context of EDC and fracking conflict. Having already completed my fieldwork at this point, my online data

collection efforts intensified while following Cochrane's (2015: 62) advice to 'go anywhere and everywhere to understand the qualities from which the quantities of accumulation emerge'. This process enabled me to accrue an extremely rich and varied data set from a highly diverse range of sources. These data included: field notes from participant observation with anti-fracking activists at PNR and elsewhere; photographs and artifacts from the field; transcripts from 31 semi-structured interviews with UK anti-fracking activists; and documentary and archival data from fracking company/investor reports and websites, online newspapers, blogs, and forums, the financial press, and social media.

4.4.3 Qualitative data management

While in the field, all qualitative field data (i.e. research diary, notepad, and Dictaphone containing interview recordings) were stored securely in a rucksack that I always kept about my person. On leaving the field, this data was kept in a locked cupboard while any digital data was password protected on my laptop. During the process of transcribing interviews, I anonymised the transcripts giving pseudonyms to any names mentioned in relation to material not in the public domain (e.g. I did not anonymise the names of the Prime Minister, government officials, or fracking company CEOs when activists referred to them in relation to their public-facing roles). All data was subsequently uploaded to NVivo data management and analysis software.

4.4.4 Data analysis and representation

As outlined previously, this research unfolded in a highly abductive non-linear manner. Consequently, rather than a discrete stage of a linear process, my data analysis was iteratively intertwined with other key aspects of the research process, including data collection and writing-up. During fieldwork I regularly assigned codes to my qualitative data as part of an ongoing analytical dialogue between myself, my research participants, and the academic literature. However, following the ECM and a reflexive science approach, much like data collection, data analysis – while certainly not arbitrary – did not follow a fixed set of linear procedures (Burawoy, 1998). Once I had established my CasP and carbon capitalism driven theoretical framework in dialogue

with my empirical data (and refined my research aim and questions accordingly), my data collection and analysis became more focused. From this point onwards, broadly following the ECM approach, my coding of qualitative data for themes was increasingly guided by an iterative dialogue between my theoretical framework and empirical data (e.g. Burrawoy, 1998). Much like – but not rigidly following – a thematic analysis approach to data analysis, this involved a process of assigning themes to data and progressively refining these (e.g. Braun and Clarke, 2006). Crucially this increasingly CasP and carbon capitalism-orientated qualitative data analysis was undertaken alongside, and in dialogue with, the quantitative analysis discussed in Section 4.3. Consequently, following the CasP approach, this qualitative-quantitative dialogue underpinned my efforts to elucidate capitalist power and vulnerability in the context of the UK fracking conflict.

Given the important role of discourse within the UK fracking conflict, my data analysis also drew loosely upon Norman Fairclough's variant of critical discourse analysis (CDA) (Fairclough, 2015). This data analysis technique was especially illuminating given its focus on conflictual and unequal power relations. Indeed, CDA is particularly appropriate for research projects seeking to identify the role of discourse; both in reproducing and challenging asymmetrical power relations (ibid.). While CDA enables critiques of discourse, it also elucidates how discourses are implicated in the (re)production of social reality. To the extent that its critiques/explanations are mobilised to influence social change by challenging the powerful, CDA can be regarded as a data analysis technique with emancipatory potential (ibid.). Consequently, I sought to deploy CDA in a manner consistent with the aim of elucidating capitalist power and vulnerability in the context of EDC and fracking conflict.

My data analysis and representation also involved the use of photographs taken during fieldwork; some of which capture protest scenes at PNR and/or the heavy policing of these protests. These photographs were deployed to substantiate my arguments regarding capitalist power and vulnerability in the context of EDC and fracking conflict. However, my deployment of such data remained mindful of the need to reduce the risk of harm to those captured in these images. As noted previously, dynamic research

settings involving large groups or crowds frequently render it unfeasible to gain written consent from everyone involved. Nevertheless, in such situations it is still incumbent on researchers to take precautions to reduce the risk of harm to others (Denscombe, 2014). This is especially important when using photographs in research since such data is harder to anonymise than textual data (Pauwels, 2008). However, while no form of research can guarantee absolute anonymity, it is possible to use photographs in a manner that reduces the risks of individuals being identified. To this end, I carefully selected photographs that were either taken from a distance or where the individuals in the foreground had their backs to the camera. I also blurred the photos to further reduce the chances of individuals being identified, following Jordan's (2014: 451) advice to 'document and disclose all alterations made to a research photograph'.

As argued previously, this thesis is underpinned by the ontological assumption that social ecological – and capitalist (Nitzan and Bichler, 2009) – reality is dynamic and processual (e.g. Rescher, 2000). However, following the reflexive science model that informs my epistemological-methodological approach (Burawoy, 1998, 2009), my attempts to represent such reality are necessarily partial and flawed. Here, it is important to consider the unavoidable gap between the 'principles of reflexive science' and the ECM that seeks to operationalise it. Consequently, despite my best efforts, this research – and its attempts to capture a dynamic/processual reality – are necessarily limited by the power effects of silencing, objectification, and normalisation (see Table 4.1, p.122). However, while these power effects can never be eliminated, they can be reduced. For example, my research did not capture every perspective within the UK anti-fracking coalition, thus silencing some anti-fracking voices while elevating others. However, this version of silencing, which sought to elevate anti-fracking standpoints on capitalist power over elite ones, is arguably preferable to starting research from the concerns of pro-fracking capitalists and studying down to elucidate anti-fracking activist vulnerability. Similarly, by analysing the conflict over a ten-year period, drawing on a highly diverse range of data sources, and interviewing activists from different parts of the UK, I endeavoured to capture the

dynamic/processual nature of the conflict to the best of my ability. Here, my use of 'positive [quantitative methods] as the handmaidens of reflexive science' was especially important as this enabled me to capture the effect(s) of social process both within and beyond the specific field sites to which I had access (Burawoy, 1998: 29). This strategy arguably helped me to reduce, but certainly not eliminate, the extent to which my analysis objectified and normalised the complex, dynamic, and processual phenomena under investigation.

4.5 Conclusion

This chapter has presented the philosophical and methodological assumptions underpinning the present work. It elaborated a processual understanding of social ecological reality before articulating how this assumption aligns with the theoretical (CasP and carbon capitalism) approaches underpinning this thesis. Having outlined CasP and carbon capitalism's epistemological-methodological toolkit (e.g. Nitzan and Bichler, 2009), I then proposed to expand this toolkit for the purposes of elucidating capitalist power and vulnerability in the context of EDC and fracking conflict. For the purposes of such expansion, I synthesised FST (e.g. Harding, 2015) with the ECM and reflexive science (e.g. Burawoy, 2009) before describing and justifying my data collection and analysis strategy. In the context of the UK fracking conflict, this strategy sought to elucidate the quantities and qualities of capitalist power and vulnerability with a view to achieving my research aim and addressing my research questions. The forthcoming chapter comprises the results of this endeavour.

Chapter 5: Exploring the UK fracking conflict through the lens of CasP and carbon capitalism

Note: Some of this chapter's quantitative analysis is already in the public domain on capitalaspower.com. This chapter also draws on arguments developed in the following co-authored paper (Lloveras et al., 2021) and co-authored research report (Barret et al., 2022).

In Chapter 1, I briefly explored how the meteoric rise of 'unconventional' oil and gas extraction (hereafter 'fracking') in the US in the late 2000s, and subsequent efforts to expand the fracking frontiers beyond North America, precipitated a global proliferation of fracking conflicts. In this chapter, I draw on the CasP and carbon capitalism inspired theoretical framework outlined at the end of Chapter 3 (Section 3.3) to investigate the UK fracking conflict; an intense and dynamic conflict that roughly spanned the decade between 2011 and 2020. This findings chapter is structured as follows. Drawing on Nitzan and Bichler's (2009) elementary particles of differential capitalisation (i.e. differential earnings, differential risk, and differential hype) alongside Cochrane and Monaghan's (2012) activist orientated CasP research, Section 5.1 explores some intriguing quantitative entry points into the innumerable (qualitative) power struggles that comprised this conflict. Section 5.2 analyses these power struggles in more depth, focusing on two broad – albeit interrelated – areas of strategic struggle: (1) the struggle to shift public opinion on fracking; and (2) the struggle to influence investors' perceptions regarding the financial viability of fracking. Drawing strongly on Di Muzio's (2015) theory of carbon capitalism, Section 5.3 conceptualises the UK fracking conflict as a power struggle over the future of petro-market civilisation. While Section 5.1 broadly provides a more macro-level analyses of the conflict, Sections 5.2 and Section 5.3 oscillate between this 'birds-eye' vantage point and more meso and micro-level analyses. Section 5.4 concludes with a summary of the chapter's main undertakings.

5.1 Some intriguing quantitative entry points into the UK fracking conflict's myriad (qualitative) power struggles

> A perfectly viable industry is being wasted because of a Government policy driven by environmental lobbying rather than science, evidence and a desire to see UK industry flourish…[The UK government is] listening to a small but loud environmental movement that opposes in principle all extraction of fossil fuels. (Natacha Engel, former UK fracking Czar quoted in Rose, 2019: Online).

Having argued that the 2019 moratorium on shale gas fracking represents a significant victory for the UK anti-fracking coalition, in this section I analyse several charts. In doing so, I argue that these charts constitute intriguing quantitative entry points into the forthcoming analysis of the myriad (qualitative) power relation/dynamics that provoked, and structured, the UK fracking conflict between 2011 and 2020. In Chapter 3 (Section *3.1.5*), I argued, following Cochrane and Monaghan (2012), that environmental justice activists can use a targeted corporation/corporate coalition's differential decumulation as a tool to gauge the success of their political economic disruption campaigns (PEDCs). However, because the anti-fracking coalition has arguably achieved one of its principal goals (i.e. halting the expansion of the UK shale gas frontier), at first sight, exploring the differential decumulation of fracking companies may seem like a superfluous exercise. Therefore, given that we have a more consequential indicator of anti-fracking success in the form of the 2019 moratorium, what is to be gained from analysing the differential decumulation of fracking companies? To answer this question, it is worth recalling Cochrane's (2010: 115) argument that while the success of resistance can be judged on multiple levels, the CasP concepts drawn upon here 'do not displace or replace these multiple layers of success'. Indeed, it is my contention that focusing on selected fracking companies' differential decumulation between 2010 and 2020 can help elucidate the forthcoming analysis of the (qualitative) power relations/dynamics/struggles that not only gave rise to the UK fracking conflict; but also, that eventually contributed to the UK government's November 2019 decision to split from the pro-fracking coalition by imposing a moratorium on shale gas fracking. I will also supplement the above with additional quantitative data concerning public attitudes to shale gas fracking during this period. Alongside the CasP literature (e.g. Cochrane and Monaghan, 2012), this

dual analytical focus is crucially informed by the following two findings from my empirical research:

1. Public attitudes to fracking constituted a key strategic battleground within the conflict with both sides struggling to shift public opinion in their favour. Thus, the anti-fracking coalition deployed a variety of tactics aimed at increasing public opposition to fracking; the ultimate goal being to make fracking so unpopular that the resulting backlash would force the UK government and investors to abandon their plans. Meanwhile, the pro-fracking coalition deployed its own tactics aimed at driving up support for fracking; the ultimate goal being to secure the necessary 'social license' to enact their plans without hindrance.

2. Perceptions regarding the financial (un)viability of the UK's nascent fracking sector constituted another key battleground within the conflict. Thus, the anti-fracking coalition deployed a range of tactics designed to cause fracking companies and their investors to question the financial viability of UK fracking and abandon their plans. Meanwhile, the pro-fracking side deployed their own tactics designed to increase investor confidence regarding the commercial viability of UK shale gas extraction.

These two findings are partially illustrated by the following exchange between the author and an interviewee from the anti-fracking coalition:

> Me: And what kind of tactics do we have at our disposal to fight fracking?
>
> Interviewee 6 (Female anti-fracking activist and Parish Councillor, 49, Kirkham, Lancashire): Well, I suppose we've got to win hearts and minds…It's a constant state of building up awareness…And of course, we've got the roadside presence. We literally are trying to disrupt activity on the [Preston New Road] site, just slow it. Every second we slow something it counts because it's about hitting them financially. And the more we become an irritant, the more their shareholders or those that are financing this think, 'Is it really worth it? Are we going to get our dollars back?'

Meanwhile, the following fragments, taken from separate pro-fracking reports (both commissioned by Cuadrilla), respectively illustrate the importance of these two findings from the perspective of the pro-fracking coalition:

> The shale gas industry needs to have a social licence to operate, and it is the responsibility of the industry to make sure that its operations are seen to be acceptable. Without a social licence to operate, the industry will find it more difficult and more time-consuming to obtain the necessary approvals to undertake exploration, and subsequent production, activities (Taylor et al., 2013: 158).

> If there is little certainty that shale gas can be brought to market, then investment during the exploration phase may not be forthcoming. This will affect the ability of developers to ascertain the full production potential. Indeed, there is a real possibility that some project developers will shy away from investing in shale gas exploration in the UK if they do not believe they can move to the production phase and capture economic benefits over and above their investment in exploration operations (Pöyry, 2014: 7).

Figure 5.1 (p.147), which charts public support for/opposition to fracking between December 2013 and March 2020, directly concerns the first strategic battleground (i.e. the struggle for 'hearts and minds'). Figure 5.2 (p.147), which charts the differential accumulation/decumulation of AJ Lucas and IGas (relative to the S&P 500), between January 2020 and December 2020 concerns the second strategic battleground (i.e. the struggle to influence investors' perceptions regarding the financial viability of UK fracking). As argued previously, according to the CasP approach, differential capitalisation expresses investors' collective assessment regarding the future (differential) earnings potential of a capitalised asset discounted for risk. Essentially, the discount rate is an interest rate applied by investors to assess the present value of a future flow of earnings deriving from any particular asset or investment. When capitalists are highly confident in their future earnings expectations, the discount rate will be low. When they are less confident in their forecasts, the discount rate will be higher (Nitzan and Bichler, 2009). To achieve differential accumulation, a corporation/corporate coalition must exert its power in ways that have at least one of the following impacts on the three elementary particles of differential capitalisation: (a) increase differential earnings; (b) increase differential hype; (c) reduce differential risk (Nitzan and Bichler, 2009; McMahon, 2022). Conversely, in their political economic

disruption campaigns (PEDCs) against a targeted corporation or corporate coalition, activists must exert their own power in in ways that push the three elementary particles of differential capitalisation in the opposite direction, thus: (a) reducing the target's differential earnings; (b) reducing its differential hype; or (c) increasing its differential risk.[39]

But why choose to focus on AJ Lucas and IGas in particular? Turning firstly to AJ Lucas. A relatively small 'micro-cap' corporation with an average market capitalisation between January 2010 and December 2020 of US$117 million, AJ Lucas is listed on the Australian stock exchange (ASX) (Chen, 2022b). The company describes itself as

> a leading provider of drilling services primarily to the Australian coal industry…it is also an investor in the exploration, appraisal and commercialisation of oil and gas prospects in the UK, with a long and proven history of returns from conventional and unconventional hydrocarbon resource investments (AJ Lucas, 2020: 1).

My interest in AJ Lucas stems from their investment in Cuadrilla Resources (hereafter Cuadrilla): a privately-owned oil and gas exploration company that was at the forefront of efforts to bring shale gas fracking to the UK between 2010 and 2020. As of 2016, AJ Lucas held a 45% stake in Cuadrilla and an effective 46.8% interest in Cuadrilla's flagship 'Bowland asset' (AJ Lucas, 2016: 5) – Cuadrilla's shale gas exploration license in Lancashire. Figure 5.3 (p.148) depicts AJ Lucas' (and others') ownership claims over Cuadrilla and its UK unconventional oil and gas exploration assets. Publicly listed on London's Alternative Investment Market (AIM), IGas is the largest *onshore* oil and gas exploration and development firm in the UK. Between 2010 and 2020, IGas were also at the forefront of efforts to accumulate differentially through UK shale gas fracking. Despite being the largest onshore oil and gas firm in the UK, IGas is a relatively small player in corporate terms (Powerbase, 2020). Indeed, between January 2010 and December 2020 IGas' market capitalisation averaged US$151 million, which also puts it in the micro-cap category (Chen, 2022b). IGas holds petroleum exploration and development licences (PEDLs) covering large parts of the UK including the East

[39] For more detail on this argument and key concepts, please see Chapter 3 (Section 3.1.4).

Midlands, the North West, West Sussex (England) and the Inner Moray Firth (Scotland). As of March 2019, IGas' ownership titles were divided between its founding executives and an assortment of investment funds. The latter include Hong Kong-based private equity firm Kerogen Capital (28%) who also own a significant stake in AJ Lucas (see Figure 5.3), UK banking conglomerate HSBC (12.2%), and Royal London Asset Management (8.3%) (Powerbase, 2020). As illustrated by the following headlines, AJ Lucas and IGas' respective share prices, market capitalisations, and differential accumulation were extremely sensitive to their UK shale gas investments during this period:

> 'AJ Lucas shares surge on UK shale speculation' (Wen, 2013: Online).
>
> 'IGas shares advance on huge UK shale gas estimates' (Ashcroft, 2013: Online).
>
> 'AJ Lucas shares slump as green groups laud "stunning victory" on UK fracking' (Macdonald-Smith, 2015: Online).
>
> 'IGas Energy shares boosts as Cuadrilla get greenlight to start fracking in Lancashire' (Ashcroft, 2018: Online).

AJ Lucas and IGas' accumulatory sensitivity to UK shale gas and the UK fracking conflict is indicative of their relative corporate diminutiveness and, relatedly, the disproportionate importance of their UK shale gas investments (relative to their other business interests). This situation can be contrasted with that of Ineos, the privately-owned oil, gas, and petrochemical giant who, from 2014 onwards, was also at the forefront of efforts to bring fracking to the UK (BBC News, 2014a). Since Ineos is privately owned and does not trade its shares on the open market, analysing its differential accumulation is less straightforward. Nevertheless, owing to the magnitude of Ineos' global business interests beyond its UK shale gas investments (Bautista et al., 2020), it follows that its differential accumulation was far less sensitive to the UK fracking conflict than that of AJ Lucas and IGas. For example, Ineos wrote-down more than US$80 million (£63 million) in shale gas assets for the year 2019 following the UK government's fracking moratorium decision (Hayhurst, 2020d). This devaluation equates to just 0.5% and 1.6% of the value of the Ineos' US$15.3 billion in revenues and US$1.4 billion in profits garnered that year, respectively (Statista, 2022; Statista, 2023). To put these figures in perspective, by the end of October 2020, AJ Lucas'

market capitalisation stood at US$31.9 million, while that of IGas stood at US$17.6 million. While these market valuations are both considerably lower than Ineos' 2019 shale gas asset write-down (US$80 million), they are also two orders of magnitude lower than the revenues and profits garnered that same year by this oil, gas, and petrochemical giant.

Beyond their status as publicly listed corporations (which, as noted previously, are more amenable to differential accumulation analysis than privately-owned ones), focusing on the differential performance of smaller firms such as AJ Lucas and IGas, as opposed to more dominant players such as Ineos, confers several analytical advantages. First, by analysing the differential accumulation/decumulation of smaller players such as AJ Lucas and IGas (which were disproportionately sensitive to the UK fracking conflict during this period), it becomes easier to discern how the power struggles that comprised this conflict were partially expressed through these financial quantities. As Cochrane notes, if a relatively large firm is challenged by a small activist group/movement, any effect of the latter's actions will likely 'disappear into all the events that bear on a massive global corporation' (Cochrane, 2021: Personal communication). However, 'if the movement is large and/or relatively effective and the company is relatively small, you absolutely might see the effects of their activism' on the targeted corporation's differential performance (ibid.). Relatedly, analysing the differential accumulation of micro-cap firms such as AJ Lucas and IGas arguably also makes it easier to discern how such firms can, through their broader alliances, capitalise government power *and/or* the power of larger corporate allies.

To gauge their success in the accumulatory struggle, capitalists need a yardstick. This latter function is typically served by 'some average benchmark – a sector benchmark, a national benchmark, and, increasingly, a global benchmark' (Bichler and Nitzan, 2004: 44). For the purposes of this study, I have chosen to assess AJ Lucas and IGas' differential accumulation relative to the S&P 500 index. A composite index covering the 500 largest US-listed equities, the S&P 500 is generally regarded as the preeminent global benchmark for gauging the financial performance of large-cap US-based equities; that is, equities whose market capitalisation exceed US$10 billion (Chen,

2022a). While AJ Lucas and IGas are both micro-cap firms, the latter being defined as publicly traded firms with market capitalisations between approximately US$50 million and US$300 million (Chen, 2022b), I have chosen to analyse their differential accumulation relative to the S&P 500. The S&P 500 is typically used as a proxy for dominant capital within CasP scholarship, so Figure 5.2 is effectively charting AJ Lucas and IGas' differential accumulation relative to this most powerful group of owners (e.g. Nitzan and Bichler, 2009). However, as illustrated by Figure C.1 and Figure C.2 (see Appendix C), which respectively chart AJ Lucas and IGas' differential accumulation/decumulation relative to the S&P 500 *and three additional indexes* (the S&P/ASX 200 Energy; the S&P 500 Energy; and the FTSE 100), whichever benchmark is selected, the overall accumulatory pattern remains broadly unchanged.[40] This enables us to be more confident in our analysis of Figure 5.2, where AJ Lucas and IGas' differential accumulation are both calculated as a ratio with the S&P 500 in the denominator and their respective market capitalisations in the numerator. Following the CasP approach, these charts should be interpreted thus: when the lines on the graph slope upwards, this indicates differential accumulation (relative to the S&P 500) for the corporation(s) in question. Conversely, when the lines on the graph slope downwards, this indicates differential decumulation (again, relative to the S&P 500).

[40] The S&P/ASX 200 Energy comprises the 200 largest energy stocks listed on the Australian stock exchange. This index is especially relevant to AJ Lucas, which has business interests in the Australian energy market. The S&P 500 Energy index comprises the 500 largest energy firms listed on the US stock market. While AJ Lucas and IGas are not listed in the US, this benchmark is a relevant sectoral benchmark for both firms. Finally, AJ Lucas and IGas' UK-based activities means the FTSE 100, the preeminent benchmark for UK-based equities, is also a relevant benchmark. However, although IGas is listed in the UK, its stocks are traded on the FTSE Alternative Investment Market (AIM), rather than the FTSE 100.

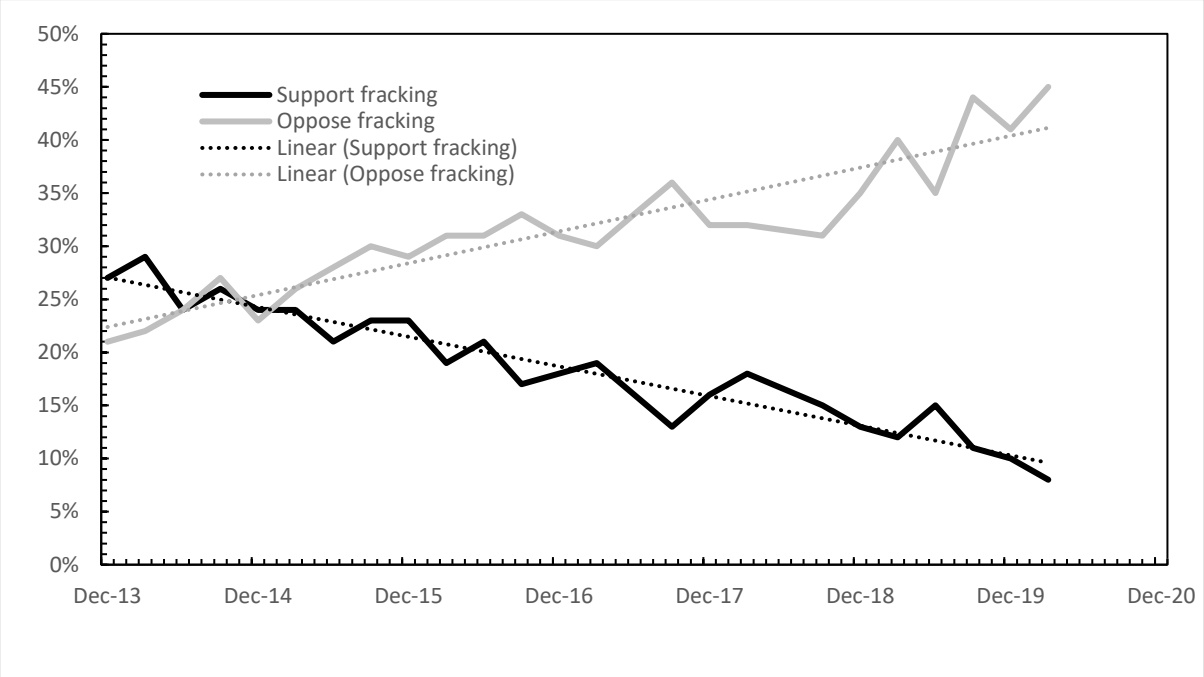


Figure 5.1 UK public support for/opposition to shale gas, December 2013-March 2020
DATA: BEIS (UK Department of Business, Energy and Industrial Strategy) (2020) Energy and Climate Change Public Attitudes Tracker: Wave 33. London: UK Government.
Available at: https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-33

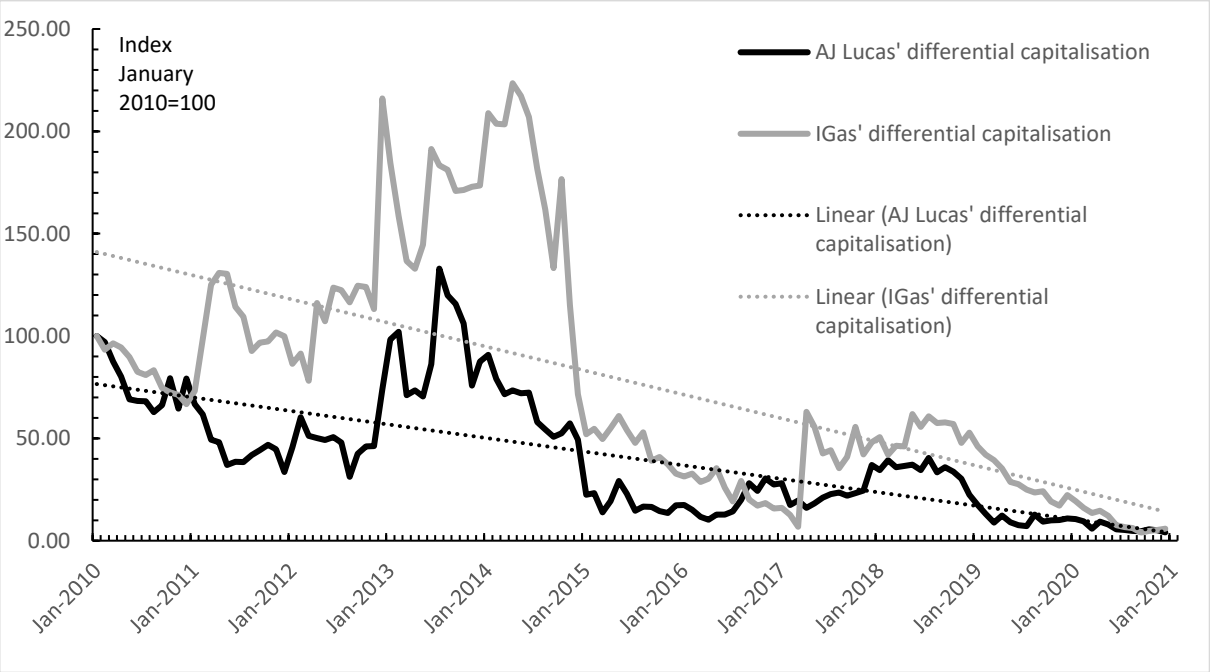


Figure 5.2 AJ Lucas and IGas' differential capitalisation relative to the S&P 500 (linear scale), January 2010-December 2020
DATA: AJ Lucas and IGas: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm
NOTE: These series are the monthly change in value of AJ Lucas and IGas' differential market capitalisations (relative to the S&P 500), with the S&P 500 in the denominator; 29/01/2010=100

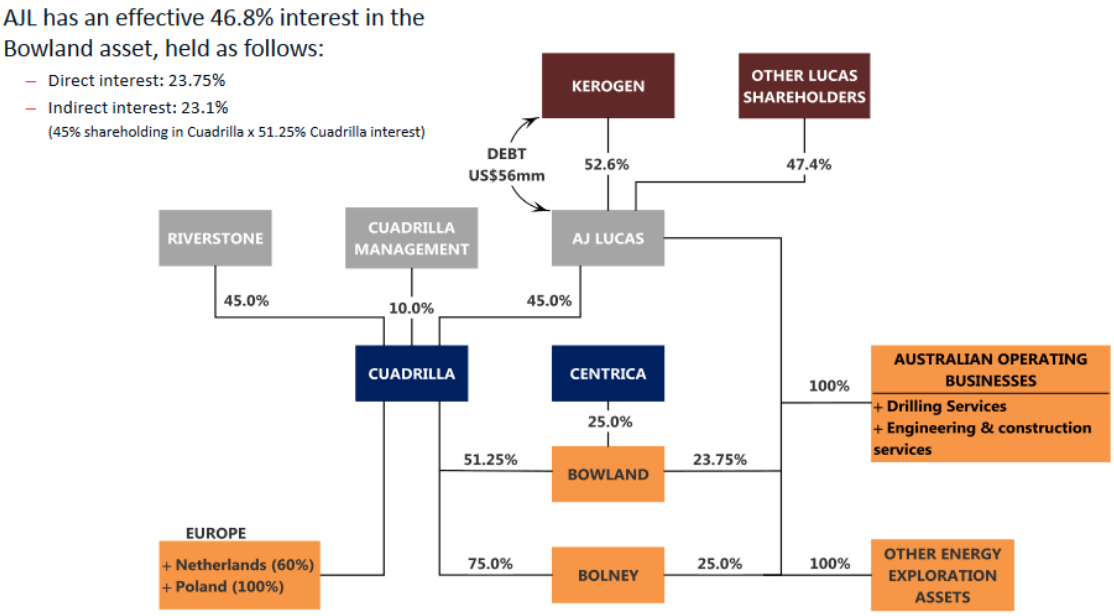


Figure 5.3 Ownership structure of AJ Lucas, Cuadrilla and their UK PEDL licenses/assets
Source: AJ Lucas, 2016: 5

The overall trends depicted in Figure 5.1 and Figure 5.2 are consistent with anti-fracking coalition success regarding their strategic objectives. In Figure 5.1, it is possible to identify two inversely related trends in UK public opinion regarding UK fracking during this period: steadily rising opposition to fracking and steadily falling support. Thus, while more people supported fracking (27%) than opposed it (21%) in December 2013, by March 2015 opposition (26%) had overtaken support (24%). Meanwhile, by March 2020, approximately three months after the UK government's November 2019 moratorium announcement on (shale gas) fracking, support for fracking had fallen to just 8% while opposition had risen to 45%.[41] Meanwhile, Figure 5.2 highlights a general trend of differential decumulation for both AJ Lucas and IGas between January 2020 and December 2020. Beyond this general trend, both series are strongly and positively correlated (r = 0.82) and their fluctuations – although by no means identical – follow a very similar pattern. For example, for both firms, it is possible to identify significant moments of differential accumulation occurring at

[41] In March 2020, support for and opposition to shale gas development stood at 45% and 8%, respectively. This leaves 47% who neither oppose nor support shale gas development.

similar times. The period 2013-2014 saw the largest spikes in differential accumulation. During this period, the hype surrounding UK shale gas was arguably at its peak (e.g. Cameron, 2013; Watt, 2014) and, as illustrated by Figure 5.1, public opposition to fracking had yet to become widespread.[42] However, as time progressed, and the companies struggled to progress their fracking plans due to planning delays, protests, and geological issues, this hype arguably gave way to investor anxiety that their UK shale gas investments were at (differential) risk, and the expected future (differential) earnings would never materialise. In November 2019, when the UK government announced a moratorium on fracking the differential risk associated with these investments arguably increased significantly.[43] Figure 5.2, which is plotted using a linear scale on the y-axis, usefully highlights the aforementioned spikes in differential accumulation. However, it is less adept at elucidating the true extent of AJ Lucas and IGas' differential decumulation following the 2019 moratorium. As noted by Blair Fix (2021: Personal communication), when plotted 'on a linear scale, a collapse in differential capitalization looks like a flat line at y = 0'. To illuminate what is obscured by this seemingly flat line, it is necessary to plot the same data again, but this time using a log scale on the y-axis.[44] In Figure 5.4, the result of this endeavour, the decade-long trend of differential decumulation for AJ Lucas and IGas is even more apparent.

[42] The other significant, albeit much smaller, spikes in differential accumulation came between 2017 and 2018 when Cuadrilla and IGas were, following lengthy planning battles, drilling their first exploratory wells in the UK since 2013 and 2014, respectively and – in Cuadrilla's case at PNR – preparing to frack for the first time since 2011.

[43] I will substantiate this argument with quantitative evidence shortly.

[44] As noted by Jonathan Nitzan (2021: Personal communication), vertical log scale charts confer the following two advantages. First, because 'the slope of the time series is proportionate to the series' temporal rate of change', this enables us to appreciate how quickly 'the series changes regardless of its absolute magnitude'. Second, large and small changes are equally perceptible within log scale charts. Linear scale charts confer neither of these advantages.

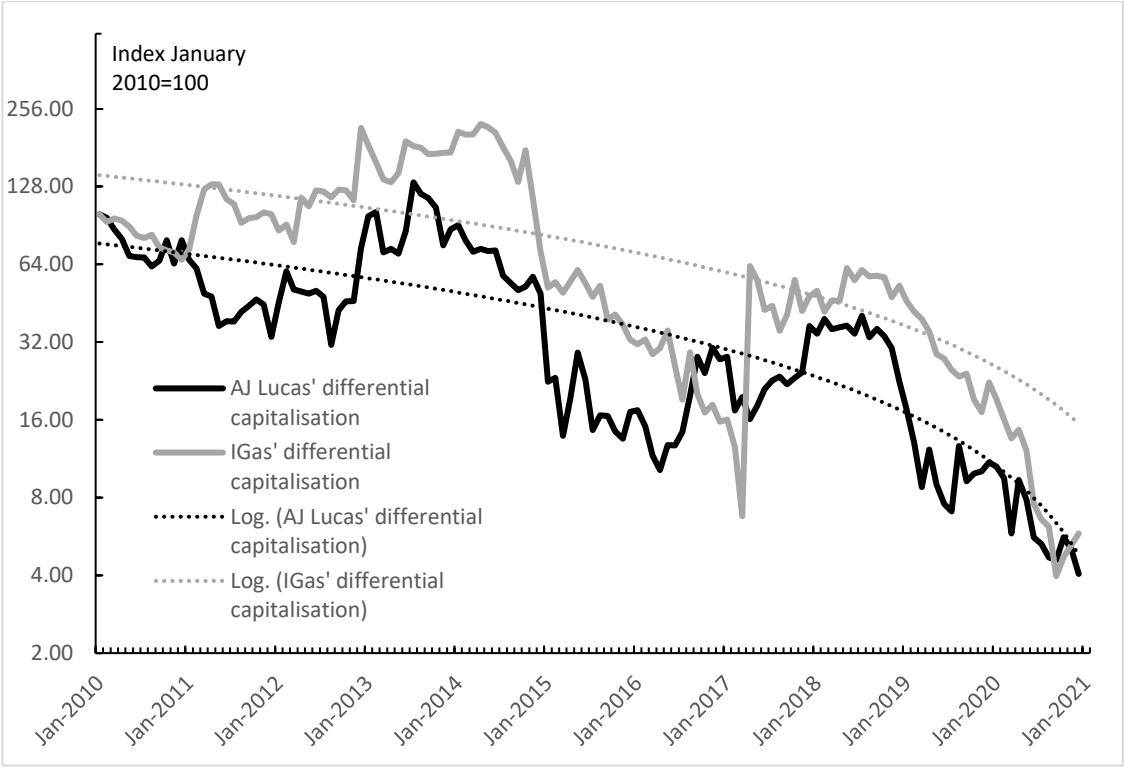


Figure 5.4 AJ Lucas and IGas' differential capitalisation relative to the S&P 500 (log scale), January 2010-December 2020

DATA: AJ Lucas and IGas: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm

NOTE 1: These series are the monthly change in value of AJ Lucas and IGas' differential market capitalisations (relative to the S&P 500), with the S&P 500 in the denominator; 29/01/2010=100

NOTE 2: A log base 2 scale is used (n^2). This means that each ascending tick mark on the y-axis corresponds to a doubling on the previous one (2, 4, 8, 16, 32, 64 etc.).

By December 2020, AJ Lucas' differential capitalisation was 96% lower than it had been in January 2010, while IGas' had declined by 94%. However, what can be seen most clearly in Figure 5.4 is the extent of AJ Lucas and IGas' accumulatory declines following: (a) Cuadrilla's first round of fracking-induced tremors at PNR in the autumn of 2018 (Hayhurst, 2018b); and (b) the November 2019 moratorium decision (UK Government, 2019), which came shortly after the second round of fracking-induced tremors at PNR two months previously (Hayhurst, 2019b). By December 2020, thirteen months after the government's moratorium announcement (UK Government, 2019), AJ Lucas and IGas' differential capitalisation were respectively 59% and 70% lower than they had been prior to this announcement.

While the trends depicted in Figure 5.1, Figure 5.2, and Figure 5.4 are consistent with anti-fracking objectives, this does not necessarily mean the anti-fracking coalition were solely or even predominantly responsible for these trends. Here, it is worth recalling Cochrane and Monaghan's (2012) advice regarding the importance of remaining cautious when attempting to explain accumulatory movements in terms of some specific cause; especially considering the complex manifold 'of forces acting upon and being enacted by any given corporation' (ibid.: 102). Nevertheless, Cochrane and Monaghan also argue that, with due caution, activists 'should not hesitate to declare victory when…decumulatory trends are associated with' their PEDCs (ibid.). Of course, claiming victory is different to claiming causal responsibility for that victory. Nevertheless, given the widely held interpretation that the anti-fracking coalition played a pivotal role in influencing the UK government's November 2019 moratorium decision (e.g. Rose, 2019; Bradshaw et al., 2022; Richardson, 2022; Ambrose, 2022; Ratcliffe, 2022), the trends depicted in Figure 5.2, and Figure 5.4 might be regarded, to a significant degree, as further circumstantial evidence of the anti-fracking coalition's strategic success. However, the above qualification – i.e. 'to some degree at least' – acknowledges the importance of Cochrane and Monaghan's (2012) point about remaining cautious when attempting to tie specific quantitative trends to specific qualitative phenomena. Although this point directly concerns Figure 5.2 and Figure 5.4, it is also relevant to Figure 5.1. Thus, while manifold factors beyond the influence of either pro and anti-fracking actors influenced accumulatory fortunes of AJ Lucas and IGas during this period, the same arguably applies to UK public attitudes to fracking. Nevertheless, notwithstanding the multitude of other consequential factors involved, it is my contention that the qualitative power struggles that underpinned this decade-long conflict are, to some extent (and to varying degrees at different times), articulated quantitatively in the trends depicted in Figure 5.1, Figure 5.2, and Figure 5.4. Regarding Figure 5.1, this latter claim finds support in the social scientific literature on fracking. For example, drawing on previous research (e.g. Mazur, 2014; Howell, 2018; O'Hara et al., 2015), Bradshaw et al. (2022: 11) argue that early anti-fracking protests were pivotal in increasing the salience of the fracking issue in the UK and 'in

starting to turn broader public attitudes against shale development'. As noted previously, the pro-fracking coalition were acutely aware that their plans to rapidly expand 'unconventional' oil and gas extraction in the UK would be difficult to realise in the absence of public support. Indeed, as I shall explore shortly, the pro-fracking coalition expended a lot of time, money, and resources in their efforts to secure this support. While these efforts ultimately failed, Figure 5.5 suggests that both sides in the fracking conflict were correct in their assessment regarding the importance of winning the battle for public opinion.

Essentially a composite of Figure 5.1 and Figure 5.2, Figure 5.5 contains the following four time series: AJ Lucas' differential capitalisation relative to the S&P 500; IGas' differential capitalisation relative to the S&P 500; support for fracking in the UK; and opposition to fracking in the UK. Each series covers the period December 2013-March 2020.[45] Notably, AJ Lucas and IGas' differential capitalisation during this period are both positively strongly correlated with support for fracking ($r = 0.67$ and $r = 0.66$, respectively). Meanwhile, both firms' differential capitalisations are negatively strongly correlated with public opposition to fracking ($r = -0.74$ and $r = -0.66$, respectively). Of course, correlation does not equal causation and a multitude of other factors beyond public opinion would have impacted AJ Lucas and IGas' differential capitalisation during this period. Nevertheless, given that both sides of the conflict regarded winning over public opinion as strategically important, and dedicated significant time and resources to this endeavour, there is distinct possibility that these correlations are not coincidental.

[45] Figure 5.1 and Figure 5.5 draw on public attitudes to fracking data collected by the UK government. The UK Department for Business, Energy and Industrial Strategy (BEIS) Public Attitude Tracker (PAT) survey began collecting this data in December 2013 (BEIS, 2020). Several other surveys have collected similar data (e.g. Anderson-Hudson et al., 2016; Howell, 2018; ASSIST, 2019). However, due to time and data accessibility issues, here I draw solely on the BEIS PAT survey (2020). In Appendix C, I have included a chart from Ryder et al. (2020: 9) – Figure C.3 – that draws on the full range of data available. As can be seen from Figure C.3, while some surveys indicate higher/lower support for fracking than others, the overall trend of rising opposition and declining support is clear across all surveys.

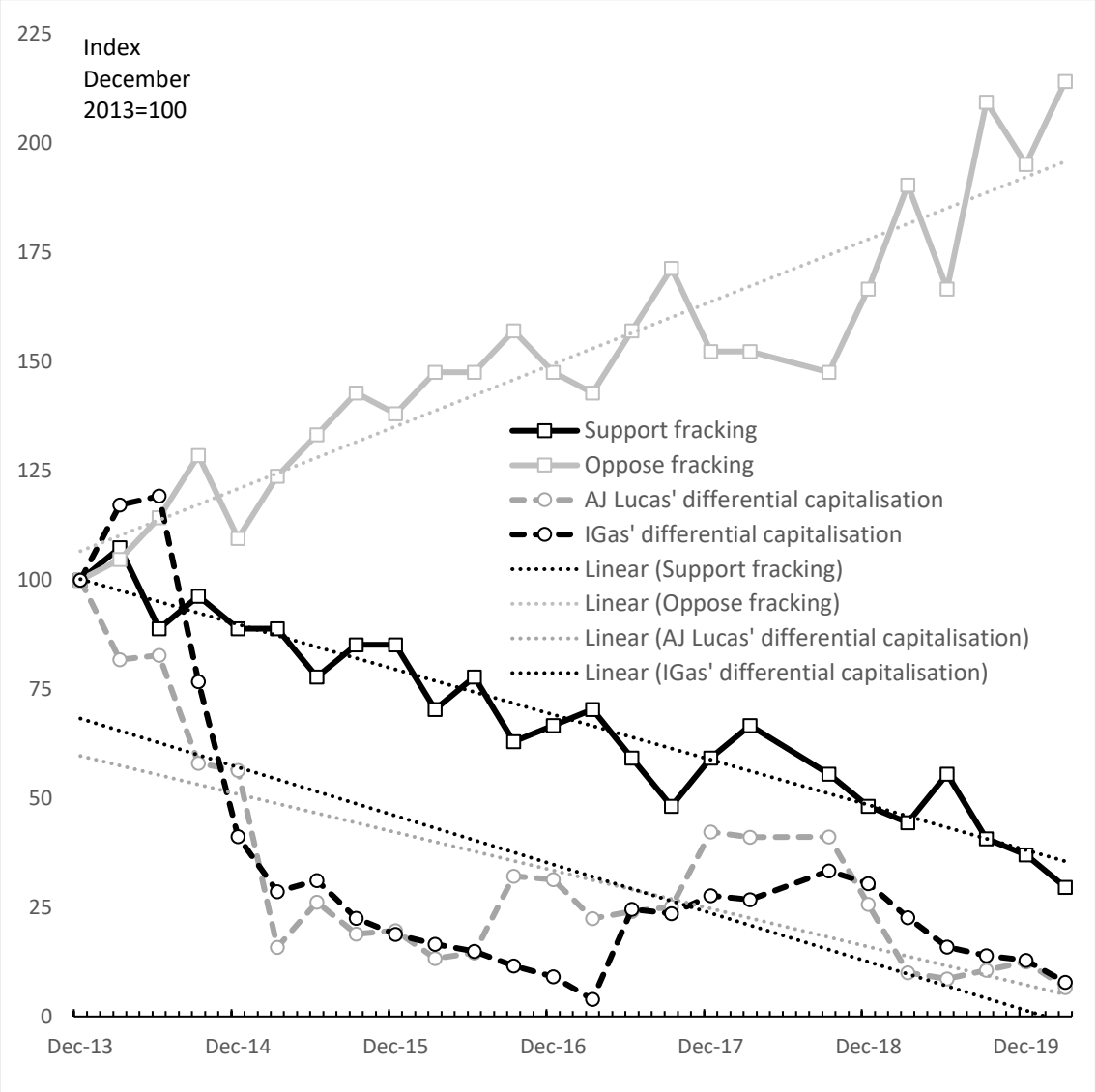


Figure 5.5 AJ Lucas' and IGas' differential capitalization; and public support for/opposition to fracking, December 2013-March 2020

DATA: AJ Lucas and IGas: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm; Public support/opposition to fracking: BEIS (UK Department of Business, Energy and Industrial Strategy) (2020) Energy and Climate Change Public Attitudes Tracker: Wave 33. London: UK Government. Available at: https://www.gov.uk/government/statistics/beis-public-attitudes-tracker-wave-33

NOTE: These series are: the monthly change in value of AJ Lucas and IGas' differential market capitalisation relative to the S&P 500, with the S&P 500 in the denominator; and UK support/opposition to fracking; 31/12/2013=100

To better understand what might be driving these correlations, it is worth reconsidering the elementary particles of differential capitalisation. As argued previously (see *Section 3.1.4*), a corporation or corporate coalition can achieve differential accumulation via three broad avenues:

1. increasing its differential earnings
2. increasing its differential hype
3. decreasing its differential risk (Nitzan and Bichler, 2009; McMahon, 2022).

This situation presents activists with three strategic avenues through which to disrupt the differential accumulation of their corporate opponent(s) – whether that be an individual corporation or, as per the UK fracking conflict, a corporate coalition. Namely, by deploying strategies and tactics that have at least one of the following impacts on their corporate opponent/s:

1. decreasing its/their differential earnings
2. decreasing its/their differential hype
3. increasing its/their differential risk.[46]

If declining public support for fracking in the UK – which prior research indicates has been influenced by the anti-fracking activism (e.g. Mazur, 2014; Howell, 2018; O'Hara et al., 2015; Bradshaw et al., 2022) – did contribute to AJ Lucas and IGas' differential decumulation, it is most likely to have done so via its impacts on the elementary particles of differential hype and/or differential risk; that is, by increasing both firms' differential risk and/or reducing their differential hype. AJ Lucas and IGas' differential earnings are unlikely to be significantly impacted by public sentiment on fracking. This is because such earnings are dependent on the fossil fuels business; a key lynchpin of petro-market civilisation and the energy-intensive forms of social reproduction on which billions of people are increasingly reliant (Di Muzio, 2015). Consequently, analysing the relationship between each firms' differential earnings and differential capitalisation emerges as a useful endeavour. Such analysis is useful because it provides a means of assessing which elementary particles of differential capitalisation were most responsible for AJ Lucas and IGas' differential decumulation during this

[46] As noted in Section 3.1.5, this argument draws inspiration from Troy Cochrane and Jeff Monaghan's work (e.g. Cochrane, 2010; Cochrane and Monaghan, 2012). Through their activist-oriented reading of CasP, these authors usefully explore how social justice activists can disrupt the accumulatory process by increasing a corporate target's differential risk. However, Cochrane and Monaghan do not explicitly argue that activists can disrupt accumulation via all three of the routes outlined above.

period.[47] Thus, in a scenario where differential earnings and differential capitalisation were positively and strongly correlated, this would indicate that the former was principally responsible for driving the latter. Conversely, in a scenario where the relationship between differential earnings and differential capitalisation was considerably looser, this would indicate that the latter was most likely being driven by some combination of differential hype and/or differential risk.[48]

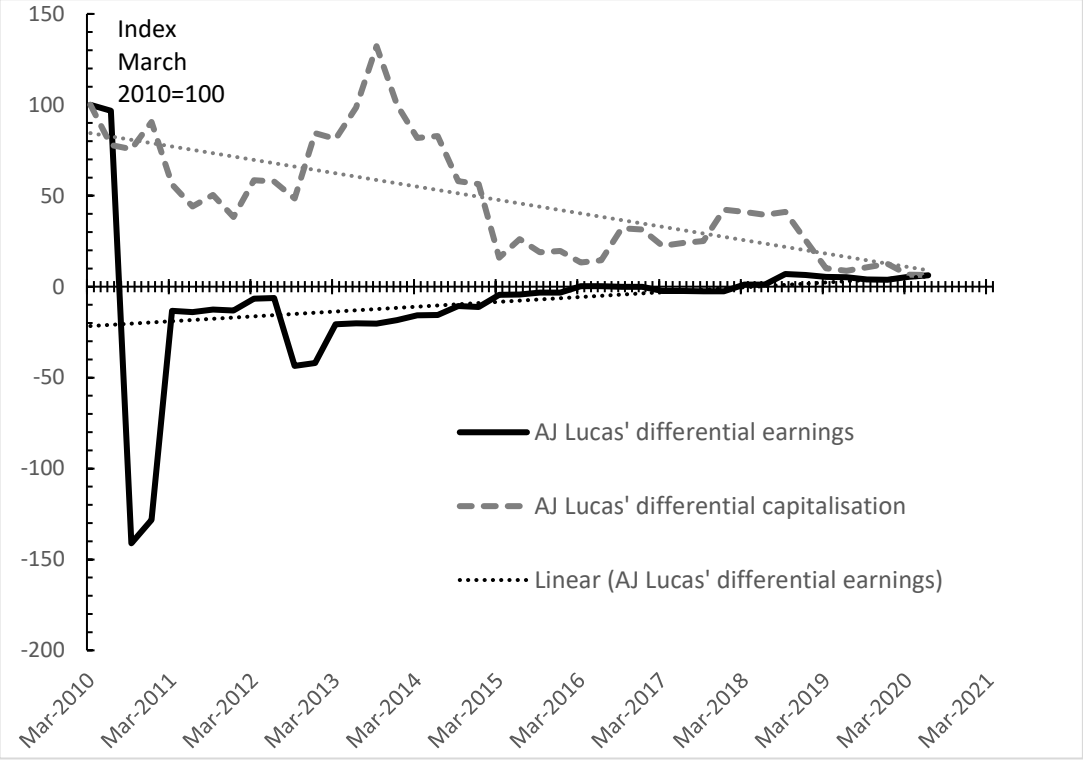


Figure 5.6 AJ Lucas' differential capitalisation and differential earnings relative to the S&P 500, March 2010-June 2020

DATA: AJ Lucas: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm

NOTE: These series are the quarterly change in value of AJ Lucas' differential market capitalisation relative to the S&P 500, with the S&P 500 in the denominator; and the quarterly change in value of AJ Lucas' differential earnings relative to the S&P 500, with the S&P 500 in the denominator; 31/03/2010=100

[47] I would like to thank Jonathan Nitzan for helping me to understand the value and significance of this analysis.

[48] Isolating differential earnings from differential risk and differential hype using quantitative analysis is relatively simple. This is because corporate earnings data are readily available. However, as far as I am aware, there is no straightforward way of separating differential risk from differential hype using quantitative analysis. Consequently, isolating these two remaining elementary particles of differential capitalisation requires careful qualitative analysis of the contextual factors and power dynamics that are articulated through differential capitalisation.

As illustrated by Figure 5.6 (AJ Lucas) and Figure 5.7 (IGas), the relationship between each firm's differential earnings and differential capitalisation appears to correspond with the latter scenario.

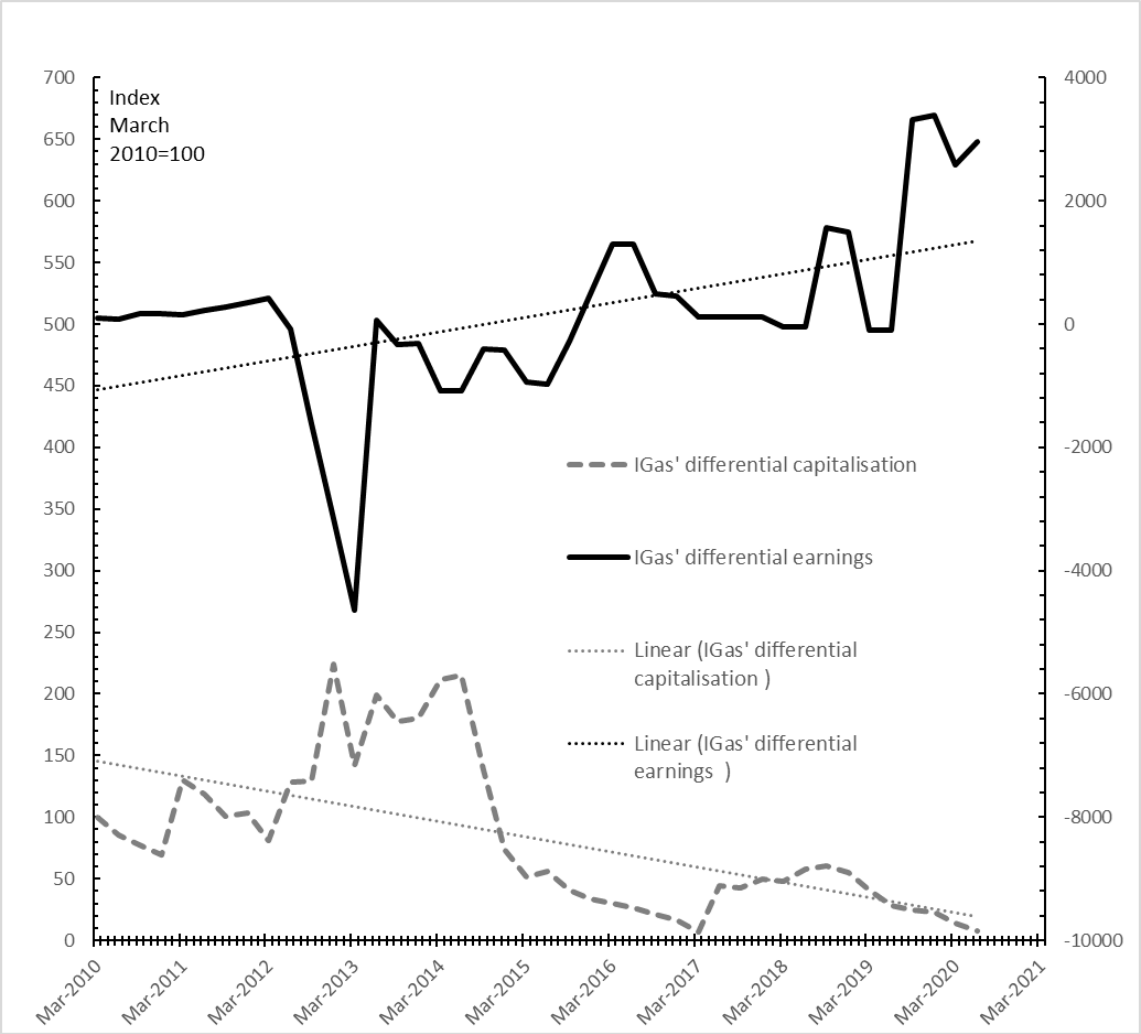


Figure 5.7 IGas' differential capitalisation and differential earnings relative to the S&P 500, March 2010-June 2020

DATA: IGas: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm

NOTE: These series are the quarterly change in value of IGas' differential market capitalisation relative to the S&P 500, with the S&P 500 in the denominator; and the quarterly change in value of IGas' differential earnings relative to the S&P 500, with the S&P 500 in the denominator; gaps in the IGas' earnings data for Q2 2011, Q3 2011, Q4 2011, Q3 2012, Q4 2012, Q3 2015, Q4 2015 were filled using estimates derived from linear interpolation; 31/03/2010=100

IGas' differential earnings are considerably higher than those of AJ Lucas. However, more important for our purposes is the fact that, for both firms, this key elementary particle and differential capitalisation frequently move in opposite directions. Indeed, in both figures differential earnings can be seen trending upwards (albeit relatively slowly for AJ Lucas), while differential capitalisation trends downwards. Moreover, each firms' differential capitalisation and differential earnings during this period were negatively correlated (r= -0.20 for AJ Lucas and r= -0.59 for IGas). This suggests that, for both AJ Lucas and IGas, increasing differential risk and/or declining differential hype (not falling differential earnings), drove their decade-long trend of differential decumulation. This seems especially true of the steep declines in both firms' differential capitalisation that followed the November 2019 moratorium announcement (see Figure 5.4, p.150). As discussed previously, these steep declines were arguably driven by the sharp increases in differential risk and, to a lesser extent, the reduced differential hype that resulted from this announcement. These findings make sense given the highly speculative nature of shale gas exploration, which revolved around the *anticipation* of future earnings (rather than the existence of *actual* earnings). They also cohere with evidence regarding the strong positive correlation between declining public support for fracking and the differential decumulation of AJ Lucas and IGas. Indeed, public sentiment regarding fracking is most likely to influence the elementary particles of differential hype and/or differential risk. Whereas, because petro-market civilisation, and its dominant energy-intensive forms of social reproduction, fundamentally depend on fossil fuels (Di Muzio, 2015), public sentiment regarding fracking is less likely to impact oil and gas corporations' differential earnings.

My quantitative analysis would also appear to support Nitzan and Bichler's (2009) argument regarding the crucial role of government power in the capitalisation of privately-owned assets. Thus, AJ Lucas and IGas' differential decumulation following the UK government's 2019 moratorium on shale gas fracking arguably highlights the waning power of the wider pro-fracking coalition to continue exerting a strong influence over the UK government shale gas policy. Indeed, as argued previously, prior

to this policy U-turn, the UK government were a key constituent of this coalition. It is possible to identify other key government decisions that significantly impacted upon AJ Lucas and IGas' differential performance. For example, by 31 December 2012, boosted by the UK government's decision to lift the first moratorium on fracking earlier that month, AJ Lucas' differential capitalisation had soared by 60% (relative to the previous month) while that of IGas had increased by 91%. Similarly, by 31 August 2016, following the announcement of government proposals for residents living near shale gas wells to receive cash payments as part of a 'Shale Wealth Fund' (Prime Minister's Office, 2016), a move intended to boost local support for such projects, AJ Lucas and IGas' differential capitalisations had increased by 38% and 52%, respectively.

However, to the extent that the UK government's decade-long support for shale gas development depended on successful lobbying by the wider pro-fracking coalition (which included larger corporate actors such as Ineos, Centrica, Riverstone, Total, GDF Suez, and others), it might also be argued that AJ Lucas and IGas also partially capitalised the power of their more dominant corporate allies. Indeed, there is some evidence that AJ Lucas explicitly sought to boost investor confidence in its UK shale gas investment by leveraging its commercial relationships with larger, more dominant corporations. For example, in a March 2016 presentation to investors, AJ Lucas argued that its 'farm-in transactions' with energy 'majors' such as Centrica (June 2013), GDF Suez (October 2013), Total (January 2014), and Ineos (March 2015) provided '(i)ndustry validation of [its UK shale gas] investment thesis' (AJ Lucas, 2016: 7).

Having outlined the general contours of the UK fracking conflict through the charts and quantities discussed above, it is now time to qualitatively explore some of the key contextual factors and power dynamics that are partially expressed through these quantities.

5.2 Power struggles to shift public opinion on UK fracking and investors' perceptions regarding its financial viability

Previously, I argued the UK government's November 2019 decision to impose a moratorium on shale gas fracking in England represented both a watershed moment in the UK fracking conflict and an important, albeit partial, victory for the UK anti-fracking coalition. I then highlighted two key strategic battlegrounds within this decade-long conflict: (1) the struggle to shift public opinion (in favour of shale gas extraction for the pro-fracking coalition and against it for the anti-fracking coalition); and (2) the struggle to influence investors' perceptions regarding the financial viability of the UK's fracking sector. I then outlined the general contours of this conflict via quantitative analysis of: (a) UK public attitudes to fracking (December 2013-March 2020); and (b) the differential decumulation AJ Lucas and IGas (January 2010-December 2020). This CasP-inspired analysis of quantities yielded some intriguing results that warrant further qualitative investigation (Nitzan and Bichler, 2009; Cochrane and Monaghan, 2012). Chief amongst these results is the finding that steadily rising opposition to UK shale gas extraction was highly correlated with AJ Lucas and IGas' differential decumulation between December 2013 and March 2020 (see Figure 5.5, p.153). In the context of the ongoing moratorium that, to a significant extent, can be attributed to the effectiveness of the anti-fracking coalition (e.g. Bradshaw et al., 2022; Richardson, 2022; Ambrose, 2022; Ratcliffe, 2022), I argued that these trends might usefully be understood as partial expressions of: (1) the anti-fracking coalition's increasing potency during this period; and (2) the pro-fracking coalition's declining power to convince: (a) the UK public that fracking was in their interests; and (b) global investors that fracking was a viable business opportunity with the capacity to generate future earnings. Although these two strategic battlegrounds – i.e. public opinion and investor confidence – are distinct, they are also highly interrelated. Evidence for these interrelations can be found in the strong positive correlation between declining public support for fracking and the differential decumulation of AJ Lucas and IGas between 2013 and 2020 (see Figure 5.5, p.153).

The finding that AJ Lucas (see Figure 5.6, p.155) and IGas' (see Figure 5.7, p.156) differential capitalisation trended downwards (differential decumulation) while their differential earnings trended upwards is also revealing. For this indicates that rising differential risk and/or falling differential hype (as opposed to decreasing differential earnings) were chiefly responsible for AJ Lucas and IGas' differential decumulation between 2010 and 2020. These findings cohere with the strong positive correlation between declining public support for fracking and AJ Lucas and IGas differential decumulation. Indeed, the elementary particles of differential hype and differential risk (which I will explore in more detail shortly), are far more likely to be influenced by public opinion on fracking. Indeed, given the centrality of fossil fuels to petro-market civilisation (Di Muzio, 2015), public attitudes to fracking are considerably less likely to impact oil and gas corporations' differential earnings.

I will now explore these two strategic battlegrounds – i.e. the struggle to win over public opinion and the struggle to influence investors' perceptions regarding the financial viability of UK fracking – through a qualitative analysis of the power relations/dynamics that are partially expressed in the quantities discussed above. Although these two strategic battlegrounds are highly interrelated, for practical purposes I will analyse each one separately. However, where appropriate, I will also try to elucidate some of their key interrelations. Section 5.2.1 explores the struggle for public opinion, while section 5.2.2 explores the struggle to influence investors' perceptions regarding the financial viability of UK fracking.

5.2.1 The struggle for public opinion

5.2.1.1 The pro-fracking coalition's fracking hype offensive and public opinion

As I shall explore shortly, hype played a central role in the struggle to influence investors' perceptions regarding the financial viability of UK fracking. However, bringing this empirical case study into dialogue with Di Liberto's (2022) extension of Nitzan and Bichler (2009), I would argue that hype was just as important to the struggle to shift public opinion behind/against fracking. Here, I draw on two of Di Liberto's (2022) arguments. Firstly, the argument that, beyond its key function of

inflating investors' expectations regarding the magnitude of future earnings, hype enables capitalists to counteract resistance by increasing public confidence in the prospect of future reward. Secondly, I also draw on the argument that, throughout capitalism's history, the most significant waves of what Di Liberto terms 'systemic hype' have tended to be intimately connected with technological innovation. Here, systemic hype is defined 'as the cyclical frenzy that accompanies the introduction of new products and technologies' (Di Liberto, 2022: 7). This systemic phenomenon, which Di Liberto describes as a 'form of novelty-driven hype', is produced through discourses that exaggerate the transformative potential of new technology (ibid, 2022: 7). These points resonate with the UK fracking conflict where the pro-fracking coalition arguably sought to overcome resistance to its plans through the deployment of 'systemic hype'. That is, through discourses that exaggerated the potential for shale gas development, based on innovative fracking technologies, to deliver generalised future rewards; not only for businesses large and small, but also for ordinary people, local communities, places, and the UK more generally. These pro-fracking hype discourses tended to frame shale gas as an 'economic' opportunity, typically emphasising its potential to deliver future rewards in form of investment, jobs, economic growth, and increased tax revenues. The following quote from David Cameron, the (then) UK Prime Minister whose government was a key player in the pro-fracking coalition, provides a useful illustration:

> Shale is important for our country. It could bring 74,000 jobs, over £3bn of investment, give us cheaper energy for the future, and increase our energy security…I want us to get on board this change that is doing so much good and bringing so much benefit to North America. I want us to benefit from it here as well (BBC, 2014b: Online).

While this quote is an example of pro-fracking hype discourse aimed broadly at the UK public, actors within the pro-fracking coalition frequently aimed their pro-fracking hype discourses more narrowly at sub-sections of the UK public. As illustrated by the following quote, UK businesses were a frequent target of pro-fracking hype discourses:

> This report demonstrates the big prize that could be available to the UK in terms of jobs and manufacturing in the supply chain for our onshore oil and gas industry…I want this report to be a call to action for the UK supply chain for small and large companies, whether in Lancashire or Lowestoft, whether in the steel industry, the chemical industry, or in other manufacturing and services. The message is to get ready for shale (Lewis et al., 2014: ii).

As explored by Lloveras et al. (2021), pro-fracking hype discourses were also frequently aimed at communities located in the areas being targeted for fracking.[49] For example, Cuadrilla, dedicated significant time, effort, and resources to the task of gaining local support for their plans. As illustrated by the following quote, the deployment of hype discourses emphasising the potential for shale gas development to deliver future rewards for Lancastrians formed a key aspect of this strategy:

> Creating jobs, investment, new skills and community initiatives as a result of shale gas exploration is very important to us and, as a Lancashire based company, in 2016 we launched our "Putting Lancashire First Commitments", publicly signed by our CEO, Francis Egan, as a firm commitment to the county which ensures that Cuadrilla puts Lancashire first in terms of the benefits of shale gas exploration has to offer (Cuadrilla Resources, 2019: Online).

Alongside the supposed 'economic benefits' outlined above, pro-fracking hype discourses frequently framed shale gas as a boon for the global fight against climate change. Here, pro-fracking actors would typically frame gas, which contains less carbon dioxide than coal, as a 'bridge' fuel that, by displacing coal, could help meet the UK's energy needs during the transition to renewables. This argument is exemplified by the following quote taken from a 2013 speech by Ed Davey, the (then) Secretary of State for Energy and Climate Change:

> Gas, as the cleanest fossil fuel, is part of the answer to climate change, as a bridge in our transition to a green future, especially in our move away from coal. Gas will buy us the time we need over the coming decades to get enough low carbon technology up and running so we can power the country and keep cutting emissions (Davey, 2013: Online).

Much like many of the 'economic' claims of pro-fracking discourses, the shale gas as a 'bridge' to renewables argument is contested. For example, such arguments frequently

[49] This co-authored paper is an outcome of this PhD research.

elide the issue of methane leakage from shale gas wells, which is considerably higher than official estimates (e.g. Howarth et al., 2011; Howarth, 2019). Methane is a far more potent greenhouse gas than carbon dioxide in terms of its capacity to trap heat in the atmosphere. Over a 20-year period, it is around 80 times more powerful and over 100 years around 28 times more powerful (Moseman and Trancik, 2023). Reflecting on the above, the shale gas as bridge fuel argument is less than convincing.

There is evidence the pro-fracking hype offensive involved significant behind-the scenes coordination between key actors in the coalition. For example, emails released under freedom of information legislation revealed the extremely close working relationship between government officials and private-sector fracking interests. Prior to the publication of an important report on shale gas and public health, press officers from the Department of Energy and Climate Change (DECC) shared 'lines to take' with members of United Kingdom Onshore Oil and Gas (UKOOG); the representative body for the UK's onshore oil and gas sector. The emails also revealed a 2013 meeting between Centrica and DECC to discuss 'managing national and local stakeholders'. In line with this coordinated approach to stakeholder management, Centrica and IGas both shared with DECC separate lists of key stakeholders that would need to be targeted. In a separate email, Centrica informed DECC of its plans to draw upon academics to boost public support for shale gas development, citing its own internal polling showing that 'academics are the most trusted sources of information to the public' (Carrington, 2014: Online). The emails also revealed that Centrica sent DECC the contested (e.g. Refracktion, 2013a) figure, derived from an Institute of Director's report (Taylor et al., 2013), that shale gas development could deliver 74,000 jobs in the UK (Carrington, 2014: Online). Despite DECC's own analysis estimating a significantly lower employment dividend from shale gas (DECC, 2014), this contentious figure was regularly cited in pro-fracking hype discourses emanating from the government and beyond. For example, this figure was cited on multiple occasions by the Prime Minister (e.g. Wintour, 2014), government departments (e.g. Department for Environment, Food and Rural Affairs [DEFRA], 2015), the onshore oil and gas industry (e.g. UKOOG, 2014), and other pro-fracking commentators in the media (e.g. Pollard, 2018). These

emails also reference a May 2013 dinner hosted by the cabinet secretary (Sir James Heywood) where senior civil servants and shale gas company executives met to discuss the future of UK shale gas development. Following this two-hour dinner, there would the opportunities for 'further discussion over post-dinner drinks' (Carrington, 2014: Online).

I will explore how the anti-fracking coalition countered the pro-fracking hype offensive shortly. However, it is important to understand that, following the earthquakes at Cuadrilla's Preese Hall exploration site in Lancashire, this offensive was increasingly focused on overcoming growing public resistance to fracking. Speaking at a 2012 summit on shale gas and the environment, Simon Whitehead, managing director of energy at PR/lobbying firm Hill and Knowlton Strategies argued that 'there is no love for shale gas' in the UK (Jones and Rowell, 2015: Online). He also argued that this would not change without

> an industry-wide, offensive campaign with a fresh new narrative giving more of a brand feel to shale gas developments. Fracking needs a re-brand, perhaps with a 'kitemark' for safe developers (ibid.: online).

To assist them in this endeavour, the fracking companies enlisted the support of multiple PR and lobbying firms who, through their connections and privileged access to policy makers, also helped their fracking clients gain such access.[50] Figure 5.8 highlights the relationships between key fracking companies/groups (top) and their PR/lobbying firms (orange box). It also highlights how these PR/lobbying firms employ well-connected former politicians, government advisors, and civil servants to ensure their clients gain privileged access to policy makers (black box). Between 2014 and 2017, Hill and Knowlton Strategies administered the UK All-party Parliamentary Group (APPG) on Unconventional Oil and Gas (Jones and Rowell, 2015).

[50] While well-connected former government advisors and civil servants are frequently employed by PR and lobbying firms, it is equally common for former lobbyists to take up positions in government (e.g. Dinan and Miller, 2007; Cave and Rowell, 2015)

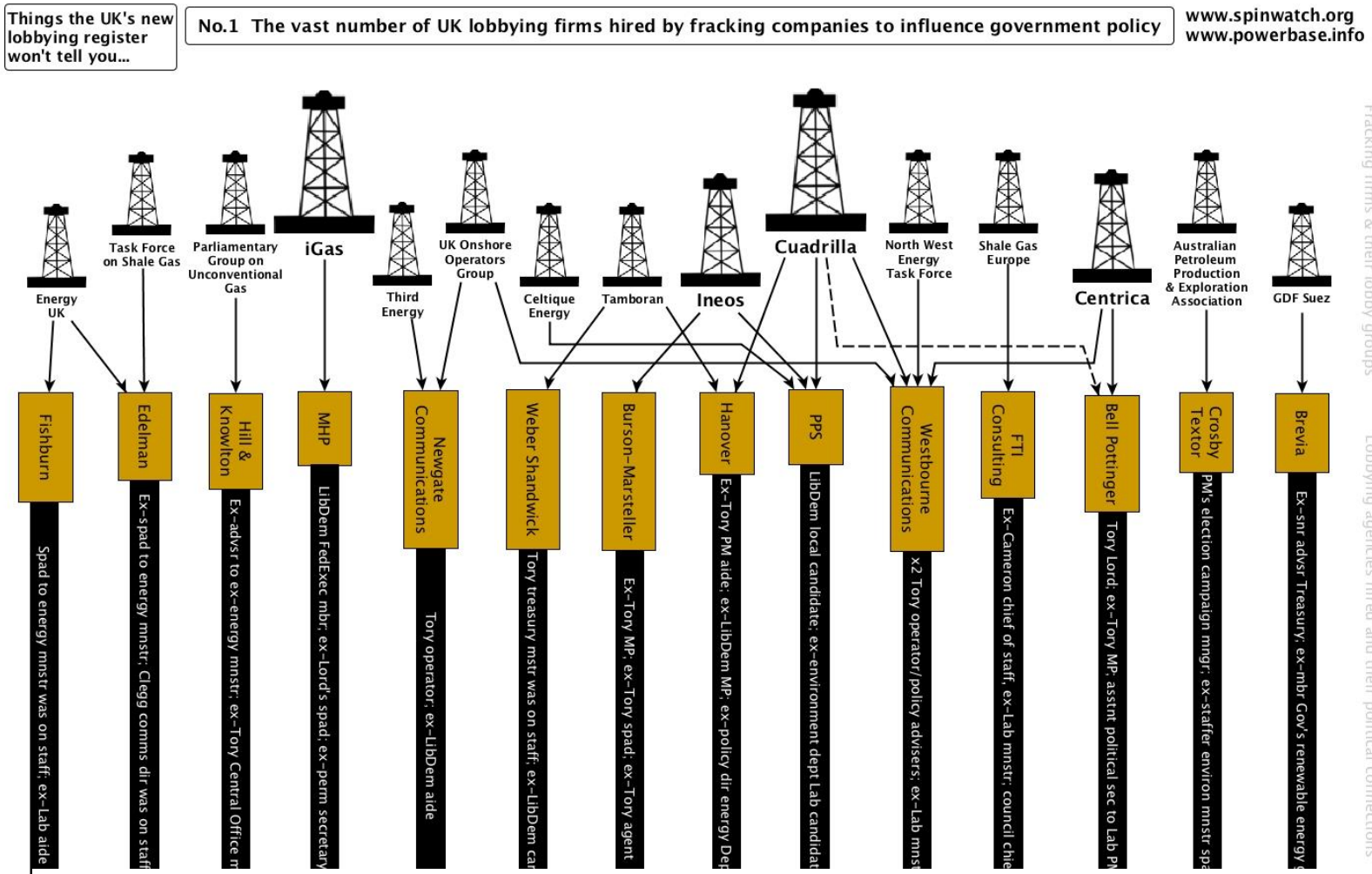


Figure 5.8 The shale gas hype nexus: Fracking companies and their well-connected PR/lobbying firms
Source: Jones and Rowell, 2015

APPGs are single topic cross-party groups organised and attended by Members of Parliament (MPs) and Lords from the UK's lower and upper legislative chambers, respectively. APPGs are supposed to facilitate dialogue between politicians and extra-parliamentary actors, contributing expertise on complicated policy areas, publishing reports, and hosting events. Frequently, APPGs rely on a 'secretariat'; a third-party organisation that provide administrative support to ensure the group's smooth running. While APPGs are not funded by Parliament, they are allowed to receive payments from external organisations to cover expenses such as secretariats, events, reports, travel, and other group activities. Once formed, APPGs are obliged to inform the Parliamentary Commissioner for Standards of their existence and any payments received from external sources must also be declared. However, beyond spending regulations concerning party-specific campaigns and regulations prohibiting individual APPG members from undertaking paid advocacy, the funding and activities undertaken by APPGs are minimally regulated (Rickard and Ozieranski, 2021; Parliamentary Commissioner for Standards, 2017). Interestingly, a 2012 survey of MPs and peers undertaken by a parliamentary working group on APPGs found that 48% of respondents either 'agreed strongly' or 'tended to agree' that 'APPGs are prone to be manipulated by public affairs and lobbying groups for their own purposes' (Straw et al., 2012: 7). According to its website, the APPG on Unconventional Oil and Gas was formed 'to provide a forum for transparent, evidence-based discussion around the issue of unconventional oil and gas development in the UK' (All-Party Parliamentary Group on Unconventional Oil and Gas, 2019: Online). Like other APPGs, this group comprised 'Parliamentary Members' and 'Associate Members'. According to the APPG's website, the latter were

> drawn from the energy industry, energy-intensive users, environmental organisations, consumer groups and universities and academic institutions. These Associate Members contribute valuable opinions and expertise to the APPG…Being an Associate Member of the APPG does not necessarily signify support for or opposition to developing unconventional oil or gas, but rather a desire to see an evidence-based debate. The Associate Members are drawn from across the spectrum of views (Powerbase, 2018: Online).

However, while this quote evokes images of a level playing field where a diverse group of actors debate the pros and cons of unconventional oil and gas development from a range of perspectives, the vast majority of this APPG's 'Associate Member' donations came from oil and gas corporations or corporations with business interests in the sector. Reflecting on the above, Jones and Rowell (2015: Online) note how 'membership of this group offers the frackers easy backdoor access to Westminster's MPs'. As illustrated by the following fragment, this analysis was shared by many of the anti-fracking activists I encountered during my fieldwork:

> It's a political battle as well, because they [the pro-fracking coalition] seem to have political influence as well over and above what I would consider normal, natural or reasonable. Things like the all-party groups they have, the all-party parliamentary groups on shale gas (Interviewee 1: Produces a well-known anti-fracking website).

The examples outlined above indicate how, as part of their pro-fracking hype offensive in Westminster, fracking companies enlisted the services of well-connected PR firms to facilitate their engagement with government and politicians. These examples provide a partial explanation of how the UK government and many politicians: (a) were drawn (deeper) into the pro-fracking coalition; and (b) also became key protagonists in the pro-fracking hype offensive.

The fracking companies also relied on PR companies to take their pro-fracking hype offensive into more hostile environments. For example, Westbourne Communications appear to have been enlisted by Cuadrilla and Centrica to help garner local support for their shale gas exploration plans in Lancashire. Whilst working for Cuadrilla and Centrica (both of whom own stakes in Cuadrilla's shale gas license in Lancashire), Westbourne also provided their services to the North West Energy Taskforce and Lancashire for Shale – two pro-shale gas 'local' lobbying groups funded by Cuadrilla and Centrica. Both groups claimed to be independent of their funders. Nevertheless, they were widely regarded within anti-fracking activist circles as industry-sponsored 'astroturfing' operations run by Westbourne on behalf of Cuadrilla to increase local

support for fracking in Lancashire (Szolucha, 2016; Refracktion, 2016; Powerbase, 2019b, 2019c, 2019d). For example:

> We proved that the North West Energy Task Force's administration was provided by Westbourne Communications, who are Cuadrilla's PR company…So we got them basically and said 'Look, basically you're Cuadrilla, aren't you?', and they kind of disappeared all of a sudden to be replaced by a new group called Lancashire for Shale, who appear to have the same mission statement at the bottom of the website, the same people seem to be involved with it, they still use some of the same documents, and they forgot to take the Westbourne Communications link off the bottom of it [the website]. Again, it was rather evident that they were involved with Westbourne Communications, so it's a kind of constant stream of these grassroots front organisations that they create to try and manipulate public opinion (Interviewee 1: Produces a well-known anti-fracking website).

It is notable that Westbourne has previously been exposed for running similar 'astroturfing' campaigns elsewhere. A 2013 investigation by Spinwatch revealed that Westbourne, working on behalf of the UK government, orchestrated a pro-HS2 (high-speed rail) campaign that presented itself as a grassroots phenomenon. Speaking at a 2012 conference, Lord James Bethell, Westbourne's founder, a hereditary peer with links to the Conservative Party, explained how this campaign had enlisted the support of celebrities and local businesses with the goal of generating 1000 enthusiastic stories extolling the virtues of high-speed rail. However, Westbourne's orchestration of the campaign was not made clear to those whom it targeted (Minton, 2013; Doward, 2013; Powerbase, 2019b).[51] There are many parallels between Westbourne's HS2 campaign, and the pro-fracking activism undertaken – with Westbourne's support – under the banners of the North West Energy Task Force and Lancashire for Shale. For example, both groups, which contained many of the same individuals (Refracktion, 2016), sought to garner support for shale gas development from local businesses and

[51] During this speech, Lord Bethell also revealed some of the more aggressive strategies and tactics deployed by Westbourne in the HS2 campaign. These included the strategy of trying to portray HS2 opponents as 'posh people standing in the way of working-class people getting jobs' (Minton, 2013: 4). Another controversial HS2 campaign tactic revealed by Bethell, one that targeted HS2 opponents directly, was to intimidate them or, in his words, 'shit them up' (ibid.; Doward, 2013; Powerbase, 2019a).

residents through pro-fracking hype discourses that framed shale gas as an economic opportunity for Lancashire. For example, in the following quote, taken from a July 2016 Drill or Drop article covering Lancashire for Shale's official launch, the pro-shale gas lobby group argued that, unless local and national politicians acted quickly, the county risked missing out on the economic opportunities associated with shale gas:

> As Lancashire-based businesses and local residents, we also believe shale gas will create opportunities for our businesses, new jobs, and much-needed investment for our County. But we are concerned that all these benefits to Lancashire risk being left behind…It's high-time for all decision-makers, both national and local, to work together to ensure that Lancashire does not miss out on the jobs and investment offered by our County's shale gas resources (Hayhurst, 2016b: Online).[52]

As illustrated by the following fragment, the extent to which the North West Energy Task Force and Lancashire for Shale were able to generate support from local businesses is contested:

> They tried to create their own pro fracking Lancashire for Shale group, which, with a lot of investigation by other members, wasn't really all it was cracked up to be. It was very, very much, a clique of people, quoting and drawing in businesses who were not always aware of what they were signing up to. This has been revealed a few times, but nevertheless, they said they spoke for the local business community when, in actual fact, it was the Lancashire Chamber of Commerce that was doing the speaking (Interviewee 21: 69-year-old female; Member of Local Friends of the Earth Group; Campaigner with Frack free Lancashire).[53]

Nevertheless, as referenced in the above quote, these pro-fracking lobbying groups did manage to forge close links with the local chamber of commerce (North & Western Lancashire Chamber of Commerce, 2016; Powerbase, 2019c, 2019d), whose leadership regularly deployed pro-fracking hype discourses during this period (e.g. Lancashire Post, 2016). However, data collection revealed that several local business owners quit

[52] At the time, Cuadrilla were awaiting a government decision on whether to greenlight its proposed shale gas exploration site at Preston New Road. Lancashire County Council had rejected Cuadrilla's planning application the previous year and, controversially, the government had decided that the secretary of state for communities and local government would have the final say (Powerbase, 2019e).

[53] See also Refracktion (2015).

the chamber in protest at its pro fracking stance and refusal to poll members on the issue:

> Now some of us were in the Chamber of Commerce, and there were no support questions asked, 'Do you support fracking? Can we support this as a body, as a whole?' And quite a few people left the Chamber of Commerce, because of their position. That they were not supportive to people who didn't support fracking (Interviewee 17: Female anti-fracking campaigner).

Regarding broader local opinion on fracking, a 2017 survey conducted by YouGov for Friends of the Earth found that 66% of Lancashire residents opposed fracking within 5 miles of their homes, while 21% supported it. Meanwhile, 54% of Lancashire residents regarded fracking as unsafe (Hayhurst, 2017a). Notably, this survey was conducted before Cuadrilla's fracking-induced earth tremors at PNR. A more recent survey of residents living within three miles of Cuadrilla's Preston New Road site found that just 12.1% of residents supported the use of 'hydraulic fracturing' in their community (Bradshaw et al., 2022). Taken together, these survey results suggest that, much like at the national level (see Figure 5.1, p.147), the pro-fracking hype offensive was not very successful in Lancashire.

5.2.1.2 The anti-fracking coalition's fracking hype deflation drive and public opinion

While many factors would have contributed to the failure of the pro-fracking hype offensive to win over public opinion, the mobilisations of the UK anti-fracking coalition arguably played an important role in this failure (Bradshaw et al., 2022; Ambrose, 2022; Ratcliffe, 2022). In their efforts to counter the *pro-fracking hype offensive* and shift public opinion against fracking, the anti-fracking coalition mounted what might be described as a *fracking hype deflation drive*. I define this as a concerted anti-fracking coalition effort, comprising a range of tactics and discourses, to shift public opinion against fracking by exposing and puncturing pro-fracking hype. The anti-fracking coalition's *fracking hype deflation drive* relied on the strategic mobilisation of alternative discourses to counter those of their pro-fracking opponents. These discourses were deployed through a variety of channels, including information stalls, public talks, placards, billboards, and banners (e.g. see Figure 5.9), artwork (e.g. see

Figure 5.10), leaflets (e.g. see Figure 5.11), and both social (e.g. Frack Off, 2019) and traditional media such as national (e.g. Horsborough, 2012) and local press (e.g. Lancashire Evening Post, 2013). While right-wing newspapers such as *The Daily Mail*, *The Sun*, and *The Telegraph* tended to foreground pro-fracking discourses (e.g. Cameron, 2013; Pollard, 2018; Rose, 2019), liberal/left of centre outlets such as *The Guardian* and *The Independent* regularly foreground the discourses of anti-fracking actors (e.g. Taylor and Harvey, 2013; Drury, 2018). TV and radio news, both national and local, also served as key media for the widespread dissemination of anti-fracking discourses. Regulated by Ofcom, these media are subject to the latter's 'due impartiality and due accuracy rules', which arguably benefitted the anti-fracking coalition more than its pro-fracking counterpart (Ofcom, 2023: online).

Figure 5.9 Anti-fracking billboards, banners, and placards. Preston New Road, Lancashire
Source: Author's photographs, 2018

Figure 5.10 Anti-fracking artwork, Preston New Road, Lancashire
Source: Author's photograph, 2018.

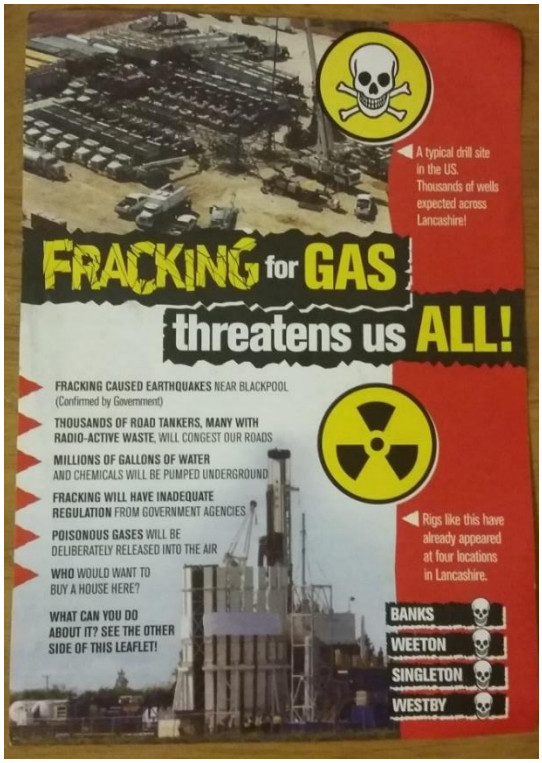


Figure 5.11 Anti-fracking leaflet, Lancashire
Source: Author's photograph, 2018

Figure 5.12 Fracking debate on Channel 4 News
Source: Channel 4 News, 2015: online

Importantly, these rules mandate that

> in dealing with matters of major political and industrial controversy and major matters relating to current public policy an appropriately wide range of significant views must be included and given due weight (ibid.: online).

Thus, while these rules facilitated the dissemination of pro-fracking discourses, they were crucial in ensuring that anti-fracking discourses also reached broad audiences during this period (e.g. BBC News, 2014; Channel 4 News, 2015; ITV News, 2018; FrackoffuK, 2012a, 2012b). This 'balanced' reporting on UK fracking is illustrated by Figure 5.12, a screenshot taken from a Channel 4 News 'fracking debate' between an oil and gas company CEO and an anti-fracking activist. Nevertheless, echoing critiques frequently levelled at the BBC and other media outlets for platforming climate change denialism in the name of 'impartiality' (e.g. Ward, 2011), many anti-fracking activists were critical of the broadcast media coverage on fracking for not adjudicating between each side's competing arguments. Thus, despite the rapidly expanding academic literature on the negative environmental and health impacts of fracking (e.g. Vengosh

et al., 2014; Casey et al., 2016; Bushkin-Bedient, 2019), this literature was rarely drawn upon by broadcast journalists to contextualise or challenge pro-fracking claims that fracking was 'safe'.

As illustrated by Figure 5.9, Figure 5.10, and Figure 5.11, the local environmental and health risks associated with fracking constituted a key theme of anti-fracking fracking hype deflation discourses. Here, issues such as the potential for water and air pollution, chemical spills, road congestion, earthquakes, and industrialisation of the countryside featured recurrently. Frequently, such discourses also foregrounded the potential negative health risks associated with fracking (Residents Action on Fylde Fracking, no date; Horsburgh, 2012; Henley, 2013; Interviews). The following extract, from the website of a local anti-fracking group on Lancashire's Fylde Coast, exemplifies this:

> There is a huge risk to the local environment, particularly through chemical spills. Contamination of the aquifer through poor well…Very large radioactive sources are used during wireline logging, compromising public health…There will be an increase in traffic with 500 trucks per well and up to 800 wells across the Fylde and nearby areas – that's a lot of trucks on our roads. The process uses vast amounts of water – millions of gallons per well. The water will be supplied by United Utilities and will be fresh drinking water. Up to 40% of water used comes back up the well as contaminated fracking sludge. It contains chemicals, heavy metals and naturally occurring radon…There will be hundreds of trucks on our roads carrying this sludge – what if there is an accident? (Residents Action on Fylde Fracking, no date: online).

The extent to which such discourses helped punctuate pro-fracking hype cannot be precisely discerned. As argued previously, a multitude of forces, phenomena, and events beyond the anti-fracking coalition's control would have influenced public opinion on fracking during this period. Equally, however, many of these events helped increase the resonance of anti-fracking discourses. For example, anti-fracking local environmental risk discourses were increasingly supported by the rapidly expanding academic literature on this topic (e.g. Vengosh et al., 2014; Casey et al., 2016; Bushkin-Bedient, 2019), which also sometimes featured in media reporting on the issue (e.g. Bawden, 2015; Davis, 2017; Stone, 2017). Alongside the fact that survey respondents who oppose fracking consistently cited environmental degradation/loss as their principal concern (Bradshaw et al., 2022; BEIS, 2020), this suggests anti-fracking local

environmental risk discourses increasingly resonated with the UK public during this period.

The anti-fracking coalition also sought to puncture pro-fracking hype more directly. The following quote from a Friends of the Earth spokesperson, Craig Bennett, provides an illustration of this approach:

> Shale gas is a huge load of hype and a massive distraction for an ideological government that just wants to cut and paste the experience from the US to Britain even though it's clear that the situation here is completely different (BBC News, 2014c: 1 min 12).

Here, Bennett was contesting government claims that shale gas: (a) could contribute significantly to the UK's energy security; and (b) is compatible with efforts to combat the climate crisis. Again, helpfully for the anti-fracking coalition, the legitimacy and salience of these arguments were arguably bolstered by the fact that similar points were also being voiced publicly by energy experts in academia. For example, the following quote from Professor Jim Watson, research director at the UK Energy Research Centre, directly addresses point (a):

> It is very frustrating to keep hearing that shale gas is going to solve our energy problems – there's no evidence for that whatsoever... it's hype…It's extraordinary that ministers keep making these statements. They clearly want to create a narrative. But we are researchers – we deal in facts, not narratives. And at the moment there is no evidence on how shale gas will develop in the UK…Shale gas has been completely oversold. Where ministers got this rhetoric from I have absolutely no idea. It's very misleading for the public (Harrabin, 2014: online).

This quote is sourced from a BBC News article that ran with the following headline: 'Ministers' shale gas "hype" attacked'. The article was prompted by the publication of a report by the UK Energy Research Centre (UKERC) on the future of gas in the UK (Bradshaw et al., 2014). Providing further ammunition for the anti-fracking coalition, the report's analysis contradicted several important claims frequently found in pro-fracking hype discourses. Notably, the report argued that, given the present condition of domestic shale gas exploration, the likelihood of significant UK shale gas production before the early 2020s was unlikely. The report also found that, if the UK is to meet its emissions reduction targets legally mandated under the Climate Change Act, by 2030

the amount of electricity derived from gas-fired generation would be minimal (ibid.). As noted in the BBC article, these two findings suggest only 'a small window of opportunity for investors' in UK shale gas (Harrabin, 2014: online). Moreover, the report also argued that UK shale gas production was unlikely to achieve the required scale to have any significant impacts on UK gas prices or the UK's dependence on imported gas (Bradshaw et al., 2014). Professor Mike Bradshaw, the report's lead author, questioned the likely impact of George Osborne's proposal for shale gas revenues to be placed in a 'sovereign wealth fund' for the North of England (BBC, 2014d: online):

> Talk about a bonanza is incredible…It hasn't happened and it might never happen. Even if shale gas does get developed in the north of England, the extra amount of money generated will probably be relatively small - so the fund will be even smaller (ibid.).

While acknowledging that shale gas had significantly altered the US energy landscape, Bradshaw highlighted three key factors that are likely to prevent the UK from replicating this experience: the UK's different geological structure; its more stringent environmental regulations; and the industry's lack of progress in convincing people to support shale gas exploration in their locality (ibid.).

Although academic research and research-based public interventions helped increase the potency of anti-fracking fracking hype deflation discourses, they also provided new material for such discourses to draw upon. For example, anti-fracking website Refracktion.org regularly produced fracking *hype deflation* articles based on academic research (e.g. Refracktion, 2018, no date a, no date b). These articles were widely shared on social media by anti-fracking activists. For instance, in an April 2018 article Refracktion highlighted two recently published academic studies whose findings would likely further erode the credibility of pro-fracking hype. The first study, by Stirling University academics, explored the Scottish government's 'unconventional' oil and gas impact assessment and consultation process that informed its October 2017 decision to maintain its own fracking moratorium, which had been in place since January 2015 (Watterson and Dinan, 2018). As highlighted by Refracktion (2018), this study concluded that 'in terms of breadth, depth and scale', the Scottish government's

unconventional oil and gas impact assessment and consultation process 'appears more detailed than any undertaken to date globally' (Watterson and Dinan, 2018: 2). Refracktion (2018) also highlights how the Sterling study critiques the UK government for relying on a flawed 2013 Public Health England (PHE) report to justify its claims that fracking in the UK can be undertaken safely. For example:

> Despite several key weaknesses including neglect of mental health, no consideration of cumulative exposures and little analysis of industry practice under different regulatory regimes [5] (pp. 26–29) the PHE report has been politically significant and has been cited repeatedly by politicians and industry to claim that fracking can and will be conducted safely in the UK (Watterson and Dinan, 2018: 15).

Reflecting on these findings, the Refracktion (2018: online) article comments, somewhat wryly, that 'Ineos's attempts to sue the Scottish parliament for their [moratorium] decision may well founder on the rocks of this report'.[54] In highlighting this study, whose findings undermine claims that fracking can be undertaken safely, Refracktion arguably sought to further weaken the pro-fracking hype offensive.

The same Refracktion (2018) article points readers to a second piece of recently published academic research by academics at Manchester University on the 'Economic viability of UK shale gas' (Cooper et al., 2018: 577). Noting how this study 'would have been equally indigestible for the fracking industry', Refracktion highlights four of its key findings:

- 'UK shale gas is 2 times more expensive than LNG and 3 times more than US shale gas.
- Shale gas would have little effect on energy prices and consumer bills.
- The contribution to the GDP is small, an order of magnitude lower than in the US.
- The economic success of shale gas in the US may not be replicated in the UK' (Refracktion, 2018: online).

[54] In June 2018, a high court judge ruled against Ineos who were seeking damages from the Scottish government over its moratorium policy (Reuters, 2018).

Alongside myriad other events, articles, new stories, research findings, and discursive interventions, the public dissemination and discussion of these (and similar) research findings, both within and beyond anti-fracking networks, arguably helped combat the pro-fracking hype offensive, thus undermining public support for fracking.

5.2.1.3 Fracking hype contestation: a bridge between two strategic struggles

A key strategic objective of the fracking hype contestation discussed above was to shift UK public opinion: the pro-fracking coalition sought to inflate shale gas hype as a means of increasing public support for their plans, while the anti-fracking coalition endeavoured to punctuate/deflate shale gas hype, thus shifting public opinion against fracking. However, it is important to be mindful that this fracking hype contestation was also deeply implicated in another strategic struggle: the struggle to influence investors' perceptions regarding the financial viability of the UK shale gas business. Thus, alongside other tactics (which I will explore shortly), pro-fracking hype discourses also sought to boost investor confidence in the financial viability of UK shale gas. Similarly, alongside other tactics (also to be explored shortly), anti-fracking fracking hype deflation discourses aimed to puncture pro-fracking hype, thereby causing fracking companies and their investors to question the financial viability of UK fracking and abandon their plans. These two strategic struggles – the struggle for public opinion and the struggle to influence investors' perceptions – were highly interrelated. These interrelations become clearer once we consider why pro-fracking fracking hype discourses and anti-fracking fracking hype deflation discourses frequently targeted the same two audiences: the UK public and investors in UK fracking (both actual and potential). To answer this question, the following extract, taken from a 2017 AJ Lucas presentation for investors, is particularly instructive:

> [AJ Lucas] has an interest in a number of assets that are located in different jurisdictions. Accordingly, such assets are subject to risks particular to its location, such as changes in laws, practices and policies in the relevant jurisdiction, including laws that deal with overseas investments…*In particular, there may be considerable resistance from the public* or legislators…to certain exploration and development activities, particularly drilling and fracking…which may result in the suspension of activities, increasing regulations imposed on the activities, delays or cost increases (AJ Lucas, 2017a: 33, my emphasis).

This quote indicates how AJ Lucas, and arguably other fracking companies/investors, regarded public opposition to fracking as a key source of risk to their UK fracking investments. Consequently, it also illuminates the inverse logics underlying: (a) the pro-fracking coalition's *fracking hype offensive* targeting the UK public; and (b) the anti-fracking coalition's *fracking hype deflation drive* targeting the same audience. The former constituted an essential component of a broader pro-fracking strategy of differential risk reduction viz a viz UK shale gas (as perceived by investors). Whereas the latter might usefully be understood as a central component of a wider anti-fracking strategy of driving up the UK shale gas sector's differential risk (as perceived by investors).

From the CasP perspective that informs this analysis, capitalists exert their power over society and nature as a means of augmenting that power (Nitzan and Bichler, 2009). While capitalists can draw upon a range of financial metrics to assess their power relative to their peers, the most favoured of these is arguably *differential capitalisation* (Cochrane, 2015). Differential capitalisation is a static measure (i.e. a snapshot in time) of a corporation or corporate coalition's capitalisation relative to an appropriate financial benchmark (e.g. the S&P 500). Differential accumulation = increasing differential capitalisation, while differential decumulation = falling differential capitalisation (Nitzan and Bichler, 2009). As argued previously, to achieve differential accumulation a corporation/corporate coalition must exert its power over society and nature in ways that achieve at least one of the following outcomes:

1. increase its differential earnings
2. increase its differential hype
3. decrease its differential risk (Nitzan and Bichler, 2009; McMahon, 2022).

From this it follows environmental justice activists can inflict differential decumulation on their corporate adversaries by deploying their own power in ways that have at least one of the following three impacts:

1. decrease the target's differential earnings
2. decrease the target's differential hype
3. increase the target's differential risk.

Having established the importance of differential hype and differential risk in bridging the struggle for public opinion and the struggle to influence investors' perceptions regarding the financial viability of UK fracking, this latter struggle will now be explored in more detail.

5.2.2 The struggle to influence investors' perceptions regarding the financial viability of UK fracking

5.2.2.1 The pro-fracking coalition's fracking hype offensive and investors' perceptions

As noted previously, as part of their *pro-fracking hype* offensive, the pro-fracking coalition frequently mobilised fracking hype discourses that simultaneously targeted the UK public and shale gas investors (both actual and potential). However, pro-fracking actors regularly aimed such discourses more narrowly at investors. Much like other forms of extreme energy (e.g. tar sands, deep-sea oil and gas drilling, mountaintop removal to extract coal), unconventional oil and gas extraction is very costly; both in terms of its socio-ecological impacts and its seemingly insatiable appetite for investment capital (e.g. Short et al., 2015; Klare, 2012; Moore, 2015). This insatiable appetite for investment capital is linked to the geological realities of unconventional oil and gas wells, which have very steep decline rates compared with conventional wells. On average, the production from 'unconventional' wells declines by between 75-90% within three years. This, combined with the fact that 'unconventional' oil and gas plays typically involve the most productive 'sweet spots' being drilled first, gives rise to a treadmill dynamic whereby new wells must continually be drilled just to maintain production at existing levels (e.g. Hughes, 2013, 2016, 2021). This dynamic has generated huge increases in US oil and gas production within the last decade. However, the equally large sums of capital invested to produce these increases, combined with the resultant downward pressure on oil and gas prices, have been deleterious for the sector's profitability. Between 2010 and 2020 the US shale sector is estimated to have lost $300 billion on the fracking treadmill (Wallace-Wells, 2021).

Apart from Ineos, who were large enough to finance their drilling plans using their own retained earnings (Carrington and Macalister, 2014), the firms seeking to drill for shale

gas in the UK were arguably engaged in a continual struggle to attract and retain investors. The deployment of pro-fracking hype discourses arguably played an important role in this struggle. These discourses were disseminated via multiple channels, including oil and gas investor conferences (e.g. 121 Oil and Gas Investment, 2018, 2019), investor presentations (e.g. AJ Lucas, 2014, 2017), annual reports (e.g. IGas, 2014; AJ Lucas, 2017b), the financial press (e.g. Ashcroft, 2014)/media (e.g. Proactive Investors, 2013), and analyst reports (e.g. Edison, 2018; Bahl, 2018). The following quote from Andrew Austin, CEO of IGas, taken from a 2013 video interview with Proactive Investors, provides a useful illustration of such discourse:

> IGas is a very significant business right now, producing cash flows, producing a significant amount of energy for Britain, 3000-plus barrels a day of oil and that business can grow. There's significant opportunities for that to grow. We're looking at significant gas monetisation opportunities at the moment to make that grow, but on top of that there is this huge opportunity which is shale gas in particular and potentially shale oil. And that could make a material difference for the company, that could make a material difference for the country. And frankly, I find that really exciting, and I think that's really exciting for other people to be involved with as well (Proactive Investors, 2013: 7 min 54).

Therefore, in framing UK shale gas as 'really exciting' and a 'huge opportunity…that could make a material difference to the company' and the UK more broadly, Austin is arguably deploying pro-fracking hype as a means of inducing investors to purchase shares in IGas.

The previous quote is an example of a fracking company deploying pro-fracking hype directly to investors. However, pro-fracking hype targeting investors was frequently also generated by 'independent' third parties. Typically, these third parties were investor relations/research firms, who would target investors on behalf of their fracking company clients. It has been argued that investor relations firms specialise in financial PR that targets investors (small and large) with financial spin (e.g. Davis, 2007; Williams and Ryan, 2010). As argued by Davies (2007), financial spinning operates on multiple levels. At its most basic, the primary goal of such activity is to drive up a company's share price/market capitalisation by inducing investor demand for its shares. This involves keeping existing shareholders happy, while encouraging new

investors to purchase shares. To this end, investor relations' spin operations typically aim to highlight positive financial information that indicates continued future earnings. Typical accounting measures, such as profits, corporate earnings, and dividends provide some indication. However, as Davis explains,

> even simple measures can be creatively presented. There are also many unknown and speculative factors. Things like expected 'growth rates' and the future 'market share' in a sector are difficult to predict. Predicting the success of new products and investments, as well as wider social and economic developments, is harder still…All of which leaves ample scope for financial communicators to manage the presentation of accounting and other 'price sensitive' information (2007: 215-216).

Increasingly, firms specialising in such activities are producing sponsored reports, targeted towards investors, that analyse and forecast their corporate clients' future financial prospects (Lee, 2018). However, critics have pointed to the inherent conflict of interest involved in this practice, arguing that such analysis is likely to be overly optimistic regarding the future profitability of the firms who have commissioned it (e.g. Cowan, 2003; Metzger, 2003). While recent research findings have contested this interpretation (e.g. Billings et al., 2014), the example of pro-fracking hype presented below would seem to substantiate it.

Edison describes itself as 'an investment research and advisory company, with offices in North America, Europe, the Middle East and AsiaPacific' (Edison, 2018: online). In addition to producing research that 'is widely read by international investors, advisers and stakeholders', Edison also 'provide[s] differentiated services including investor relations and strategic consulting' (ibid.). On 9th April 2018 Edison published a press release titled 'Edison issues initiation on AJ Lucas Group (AJL)' (ibid.).[55] The press release read as follows:

[55] Widely used in financial media, the term 'coverage initiated' frequently accompanies announcements that an analyst or brokerage is issuing their first rating or analysis of a particular stock. Initially, these rating consisted of 'buy', 'sell', or 'hold', However, with the passage of time other commonly used rating terms have, amongst others, included 'strong sell', 'strong buy', 'underperform', and 'overperform'. For traders, fund managers, and investors, such announcements are significant because they frequently generate increased attention for the stock in question, often resulting in higher trading volume 'because an analyst is continually publishing on the subject going forward' (Scott, 2022: online).

> AJ Lucas offers investors exposure to the most advanced UK shale appraisal programme in the UK. Current activity is focused on a drilling campaign at Preston New Road where the company has approval to drill and test up to four horizontal wells. Prior to appraisal, which is aimed at reducing technical and economic uncertainty, we utilise a probabilistic approach to valuation estimating a 67% chance of commercial success for UK shale (NPV15 >0) with a net P50 risked value of A$0.92/share. At a group level, incorporating AJL's operating business units and net debt, we derive a P50 (mid-case) valuation of A$0.86/share…Investors should be aware of the high cost of current debt, and should make further concessions in order to factor in their view of UK shale political risk. Click here to view the full report (ibid.).

While the report does state in the small print that it 'has been commissioned by AJ Lucas Group' (Bahl, 2018: online), the press release does not mention this important detail (Edison, 2018).[56] The report further states that Edison's net P50 risked value of A$0.92 per share for AJ Lucas' UK shale gas assets equated to a total (net P50 risked value) of A$690m (Bahl, 2018). However, this valuation, which is derived from a probabilistic Monte Carlo discounted cash flow (DCF) model, seems highly optimistic and is arguably based on several questionable assumptions.[57] Before I explore these assumptions, it is worth noting Ferson's (1996: 1002) warning regarding the perils of Monte Carlo methods. As he notes, such methods can produce results that are unjustifiable or incorrect 'whenever their assumptions are false or are not justified empirically' (ibid.). With this warning in mind, I now critically explore some of the flawed assumptions underpinning Edison's valuation of AJ Lucas. These assumptions, which Edison describes as '[k]ey caveats that impact our probabilistic valuation', are summarised below alongside my critical comments (*underlined*) (ibid.).

- Drawing on calculations conducted by another consultancy, Edison's model assumes Cuadrilla's Lancashire shale gas wells can achieve similar levels of production as 'a prolific Marcellus producer' (ibid.). While noting that they

[56] In a subsequent update Edison notes that its 'standard fees are £49,500 pa for the production and broad dissemination of a detailed note (Outlook) following by regular (typically quarterly) update notes' (Edison, 2019: online).

[57] At the time of this report's publication, AJ Lucas' shares were trading at A$0.37 per share and the firm's market capitalisation was A$278m (Bahl, 2018).

'cannot validate the accuracy of this input', Edison warns that it constitutes an important driver of their valuation (ibid.). *Since the UK's highly faulted geology is very different to that of the US, this assumption is highly questionable (e.g. Stevens, 2010; DECC, 2012; Andrews, 2013; Smythe, 2014; Underhill, 2017; Smythe, 2020).*

- The model does not factor political/regulatory risk into its calculations (ibid.). *The decision not to account for political/regulatory risk is also questionable given that all major political parties, except for the ruling Conservative Party, opposed fracking at this time. This assumption also elides the high levels of public opposition to fracking, and the ongoing organising, activism, and lobbying of the anti-fracking coalition (e.g. Evans, 2017; Carbon Brief, 2017; BBC News, 2017a; Reclaim the Power, 2017; Hayhurst, 2017b 2018e, 2018f, 2018g; Fossil Free UK, 2019; CPRE, 2022.*

- The model assumes that 'extended planning processes' do not have a significant influence on fracking company valuations (ibid.). *Given that many pro-fracking actors, including Cuadrilla, frequently argued planning delays posed a threat to the viability of the UK shale gas sector this assumption is also questionable (e.g. Pöyry, 2014; Forston, 2014; Eisenhammer, 2013; Carrington, 2016*).

- The model 'does not assume resource limitations due to land access restrictions…over and above those applied by BGS in the society's calculation of GIIP [Gas Initially In Place]' (ibid.). *Given the high levels of public opposition to fracking (Hayhurst, 2018h), including growing opposition amongst landowners (2018i), this assumption is also questionable. This is linked to the model's failure to factor in political and anti-fracking coalition risk (e.g. Vaughan, 2015; Hayhurst, 2018a).*

- In line with other probabilistic DCF models, this model uses a weighted average cost of capital (WACC) as a proxy for risk. Within such models, WACC essentially serves as a discount rate (Hargrave, 2023). As noted previously, when capitalists perceive an investment to be risky they apply a high discount rate, which generates a lower valuation. When capitalists perceive an investment to be low risk, the opposite applies (Nitzan and Bichler, 2009). WACC represents the average cost of capital for a corporation as it engages in the ongoing financing of its assets, whether via debt or equity. Consequently, WACC constitutes the average rate a corporation is typically expected to pay to satisfy its owners and creditors (Hargrave, 2023). In this model, Edison applies 'a 15% WACC…to reflect the through-cycle cost of capital of a UK based E&P [exploration and production company] rather than AJ Lucas's current cost of capital' (ibid.). *It is unclear why Edison did not use 'AJ Lucas's current cost of capital' in this model. However, given what Edison describe as AJ Lucas' 'high cost of current debt' (ibid.), it is likely that this decision yielded a higher valuation than would have otherwise been achieved using the Australian firm's WACC.*

Even slight changes to any of these assumptions would yield very different valuations. For example, if Edison had based their model on more realistic assumptions, accounting for political risk, the UK's challenging geology, the negative financial implications of planning delays, and AJ Lucas' *actual* WACC, the model's headline valuation would have been considerably lower. The importance of assumptions in such exercises is illustrated by the fact that a similar analysis by Australian consultancy firm Patersons produced an even more hyped valuation of AJ Lucas' UK shale assets. As reported in an April 2018 AFR article, 'Patersons…tentatively valued AJ Lucas's interest in the Bowland at $3.4 billion-$6.4 billion, assuming about 30 tcf of gas is ultimately recovered' (Macdonald-Smith, 2018: online). Consequently, these optimistic valuations of AJ Lucas' UK shale gas assets arguably constitute examples of pro-fracking hype and financial spin targeted towards investors.

I now want to discuss perceptions of pro-fracking hype amongst AJ Lucas' *retail investors*. The term retail investor refers to individual (typically non-professional) investors who invest their own money in shares, usually on their own behalf. Institutional investors are organisations or companies that invest professionally on others' behalf (usually, other organisations/firms). Banks, mutual funds, pension funds, hedge funds, private equity firms, insurance companies, and endowments are all examples of institutional investors. Compared with retail investors, institutional investors broadly tend to: trade far more frequently; invest significantly higher amounts of money in these trades; pay less to invest; have more investment experience/knowledge; have access to more information and research (Palmer, 2023). Following Nitzan and Bichler (2002, 2009), institutional investors are considerably more powerful than retail investors; especially in terms of their ability 'not only…to identify hype, but also…to shape its trajectory' (Nitzan and Bichler, 2009: 191). During my fieldwork with anti-fracking activists in Lancashire, I was informed of an open forum where AJ Lucas retail investors regularly discussed and debated their investment in the company. Having encountered multiple discussion threads on this forum, most of these retail investors appeared to be pinning their hopes of a financial return on Cuadrilla's shale gas exploration in Lancashire.[58] Some anti-fracking activists I spoke with argued that this forum was frequently used as a platform to generate pro-fracking hype amongst retail investors:

> Yeah, so Username 1 is an honest plain talking voice, whereas Username 2 is clearly an industry cheerleader, and then there's others, but, because I've been background, I kind of got to know all these characters over the years, and it helps because then you can guess why are they saying that and what are they thinking is happening? (Interviewee 4: Female anti-fracking activist).

Interestingly, some retail investors seemed to agree with this analysis. For example, I encountered several examples where, during a discussion on the prospects for AJ Lucas' UK shale gas assets, one user would insinuate that another was seeking to hype the stock with their overly optimistic analysis. The true identities of most forum

[58] As noted previously, AJ Lucas also owned a 45% stake in Cuadrilla and an effective 46.8% interest in Cuadrilla's Bowland shale gas license during this period (AJ Lucas, 2016).

participants cannot be ascertained since most deploy a pseudonym as their username. This makes it difficult to substantiate the veracity of these claims. Nevertheless, having spent many hours on the forum, I understand how certain users might be perceived as 'industry cheerleaders' owing to their consistently optimistic forecasts regarding AJ Lucas' UK shale assets.

5.2.2.2 The anti-fracking coalition's fracking hype deflation drive and investors' perceptions

> Cuadrilla is already talking about potentially floating on the stock market after this appraisal project, but for a company which eats money and seems set to continue to do so, only the promise of a massive payout is likely to tempt investors. The fracking industry lives off hype, and it is up to the movement to take action to expose and oppose the reality of fracking (Frack Off, 2016; online).

As argued previously, unconventional oil and gas extraction is extremely capital intensive and, owing to the steep decline rates of individual wells, necessitates the drilling of ever more wells just to maintain production at existing levels (Heinberg, 2014; Hughes, 2020). Consequently, while the unconventional oil and gas sector has a seemingly insatiable appetite for investment capital, which has enabled huge increases in production, it has struggled to translate this investment/production into earnings. Indeed, between 2007 and 2020 the US fracking sector losses were reported to exceed US$250 billion (Mikulka, 2020). Considering the above, one tactic used by anti-fracking activists to deflate pro-fracking hype targeting investors was to argue that UK shale gas was, or resembled, a Ponzi scheme. Ponzi schemes can take many different forms. However, broadly speaking, they can be understood as fraudulent investment vehicles whereby the returns paid to earlier investors are derived from funds provided by later ones (Hague, 2014). The following quote from an anti-fracking activist in Lancashire provides a useful illustration of how such a scheme might work:

> So, I've got some pork belly, and I go to sell to you for 80 cents. You can probably sell it, and you already know a guy down the road wanted it for a dollar…I now sell you on paper my pork belly…So, you then tell your mate, you transfer the documents to him. He's only bought it, because he's just found out some guy up the road wants it for four quid, because he's not had any for ages. So, he now buys it off you and no one has ever taken it out of the warehouse,

> but you all made your money. Then the last guy holding it says, 'Ah great. Let's go get the pork belly'. There wasn't any pork belly…It was never an issue until the last guy was left holding it. So, that's essentially a Ponzi scheme, because you all bought into the myth of it, and it didn't exist (Interviewee 4: Female anti-fracking activist).

Having outlined how a Ponzi scheme works, Interviewee 4 then explains how their 'pork belly' scenario is analogous to the situation with AJ Lucas, Cuadrilla, and UK shale gas more generally:

> AJ Lucas is the parent company. They've gone into debt trying to make Cuadrilla work…Kerogen ended up lending them so much money, they ended up owning 51% of AJ Lucas. AJ Lucas doesn't really care, because AJ Lucas CEOs get their bonuses every year…Kerogen's fucking on cloud nine, because they keep lending all this money at huge interest, and Cuadrilla is the collateral on the loan…For the [retail] shareholders though, it's this Ponzi scheme…(T)hey're like, 'Where's the money? We bought in many of us at a dollar twenty [per share]. It's now only 33 cents today.' And so, the dollar twenty guys can't leave. They've got to wait to see if it ever pays out, because they've lost so much already, and then you've got the 40 cent guys who just bought in at the 40-cent level who are looking at the 33 cents and thinking, 'Do I just cut my losses?' (Interviewee 4: Female anti-fracking activist).

It is beyond the scope of this thesis to provide a definitive answer on whether or not UK shale gas constituted a Ponzi scheme, especially given that there are multiple competing definitions of the term (e.g. Hague, 2014). Moreover, declaring UK shale gas a Ponzi scheme in the sense that fracking company executives deliberately lied to investors is also problematic given that we do not have direct evidence for this. Here, it is worth recalling the previous argument that 'hype' (Nitzan and Bichler, 2009) and 'financial spin' (Davis, 2007) are endemic within contemporary capitalism. However, many of the techniques, practices, and creative presentations of financial data associated with financial spin and hype generation are entirely legal. As explained by one chief executive of a company specialising in financial PR:

> The market isn't all that efficient. If it were, then there would be no reason for us to exist. In the long term you can outperform the market by looking at your audiences, seeing what they believe and giving them what they want…There are many things you can do which amounts to telling them the truth in a structured and interesting way (Davis, 2007: 216).

However, as argued in a recent Desmog article titled 'Is the U.S. Fracking Boom Based on Fraud?', in finance the line separating legal (if morally questionable) practices of financial spin/hype generation and illegality is frequently blurred (Mikulka, 2020). Reflecting on the growing number of legal cases being brought by investors, who claim they were misled about the financial realities of the US shale sector, the article considers whether US fracking businesses have been capitalising on this blurriness (ibid.).[59] The article explores some of the questionable tactics commonly used within the sector to entice investors. These tactics include firms misreporting their breakeven costs of oil and gas production to make them appear more profitable. Another tactic discussed is the use of inferior methodologies that produce inflated forecasts of fracked oil and gas production when more robust methodologies are known to exist (ibid.). While this story is ostensibly focused on the US, it is notable that one of those being sued for allegedly misleading investors is Riverstone Holdings, the US private equity firm that, between March 2010 and February 2020, held a 45% ownership stake in Cuadrilla (BBC News, 2020; Thickness, 2020). However, regardless of whether fracking companies and institutional investors deliberately sought to defraud retail investors, or merely to entice them to purchase shares through legal forms of hype and financial spin, the anti-fracking activists have identified an important feature of the contemporary capitalist reality that arguably accords with Nitzan and Bichler's (2009) analysis: namely, that not all capitalists and investors are equal regarding their power and ability to: (a) redistribute income in their favour; and (b) shift risks onto other actors (including less powerful capitalists and investors). The previous quote from Interviewee 4 provides a useful illustration of how UK shale gas hype enabled some actors to make money without any hydrocarbons having ever been extracted. Arguably, then, discourses framing shale gas as a Ponzi scheme were, to a significant degree, aimed at retail investors who, relative to larger institutional investors, shouldered more of the risks associated with investment in UK fracking. From this perspective, one can understand the logic of the argument that, rather than a

[59] As of March 2020, the US shale gas and oil sector's financial losses since 2007 are reportedly to exceed US$250 billion (Mikulka, 2020).

sustainable business model, 'fracking more closely resembles a short-term Ponzi scheme' (Heinberg, 2014: 58).

Assessing the extent to which these anti-fracking 'shale gas as Ponzi scheme' discourses resonated with investors is difficult. Interestingly, many of the investor forum discussion threads I encountered were replete with critiques of AJ Lucas' management for not serving the interests of retail investors; and, of Kerogen Capital for charging AJ Lucas high interest rates while diluting the value of existing shareholders through various 'debt for equity conversion[s]' (AJ Lucas, 2019: 39). However, while anti-fracking arguments regarding UK shale gas being a Ponzi scheme were only mentioned a few times in these threads, when they were mentioned, these arguments tended to be rejected as uninformed scaremongering. Like any other investor, retail investors would likely have considered a multitude of factors when deciding whether to sell, or refrain from buying, shares in AJ Lucas, IGas, and other listed firms with interests in UK shale gas. Nevertheless, as the UK fracking conflict progressed and more evidence began to emerge regarding the precarious financial situation facing the US shale sector, the salience of 'fracking as Ponzi scheme' discourses arguably increased (e.g. Loder, 2014; Richter, 2014; Olson, 2015; Boren, 2016; Bomey, 2016; Olson and Cook, 2017; Williams-Derry, 2018; Denning, 2019).

5.2.2.3 The pro-fracking coalition's fracking investment risk reduction offensive

As argued previously regarding the struggle for public opinion, the pro-fracking hype offensive was intimately linked with efforts to influence another elementary particle of differential capitalisation of concern to investors: *differential risk*. Here, it is worth recalling Nitzan and Bichler's argument that dominant capital groups constantly strive to order society and nature in ways that reduce their differential risk. Therefore, I will

now further explore how the pro-fracking coalition sought to reduce the differential risk of UK shale gas investment during this period.[60]

Previously, I noted how a 2017 investor presentation by AJ Lucas highlighted political/regulatory risk as an important factor that investors should consider when deciding whether to invest in UK fracking (AJ Lucas, 2017a). As an instructive entry point into pro-fracking efforts to reduce the political risks of shale gas investment, there is arguably no better place to start than the case of Riverstone Holdings and Lord John Browne. In February 2010, 'Riverstone/Carlyle Global Energy and Power Funds, a group of energy-focused private equity funds managed by Riverstone Holdings' paid AJ Lucas US$58 million for a 42% equity stake in Cuadrilla (AJ Lucas, 2010: 1). At the time of this deal, Riverstone, a New York-based private equity firm focused primarily on the energy, power, and infrastructure sectors, oversaw funds totalling US$17 billion apportioned between 65 investments across four continents (ibid.). Meanwhile, Riverstone's partner in this investment, The Carlyle Group, was one of the largest private equity firms in the world with $US106.7 billion under management in 84 funds focused on multiple sectors spread across six continents (Carlyle Group, 2010). While Carlisle is well known for leveraging its high-powered political connections for its own pecuniary ends (e.g. Schneider, 2003; Shorrock, 2002; Briody, 2003), since entering into its joint venture with Carlyle, Riverstone has adopted a similar modus operandi (e.g. Wayne, 2009; Gralla, 2009). Notably, in 2007 Riverstone recruited Lord Browne, the politically connected former CEO of BP as a managing partner to head up its European investment arm (Arnold and Crooks, 2007; Sylvester, 2019). Two years later, when the AJ Lucas-Riverstone deal was signed, Browne was appointed as chairman of Cuadrilla to oversee Riverstone's investment in the UK-based fracking firm. The value of Browne's political connections for Riverstone (and the pro-fracking coalition more

[60] As argued above, differential risk was not distributed equally amongst the pro-fracking coalition during this period. For example, by lending money to AJ Lucas at 15-21% interest (e.g. AJ Lucas, 2015, 2017b), Kerogen Capital were able to reduce their own differential risk by profiting from UK shale gas hype prior to any gas being extracted. I will return to this issue in the next sub-section (5.2.2.4). However, here I will focus on the collective efforts of the pro-fracking coalition to reduce the differential risk of UK shale gas investment.

broadly) became apparent in June 2010 when he was appointed by the UK government as Lead Non-Executive Director within the Cabinet Office (Cabinet Office, 2010).[61] While this role gave Cuadrilla's chairman unrivalled access to key government departments responsible for UK fracking policy, it also afforded him considerable power to appoint non-executive directors to those departments (Leftly, 2013; Johnstone et al., 2017). Browne used these powers to recruit 54 non-executive directors across multiple government departments. Notably, Browne recruited three non-executive directors to the treasury (the powerful government department responsible for shale gas taxation policy), three to DECC (oil and gas licensing and regulation), and four to DEFRA (regulation) (Frack Off, 2012). It was later revealed that several of Browne's recruits to government had financial links with the fracking industry (Leftly, 2013). Throughout his time in government (June 2010-March 2015), Browne continued as chairman of Cuadrilla and managing director at Riverstone (Mandel, 2015). Moreover, there is evidence that Browne used his privileged access to government ministers during his tenure in the Cabinet Office to lobby on behalf of Cuadrilla and Riverstone. A 2013 Freedom of Information Request by Green Party MP, Caroline Lucas, revealed that Browne lobbied DECC ministers on behalf of Cuadrilla on four separate occasions. Two of these meetings were also attended by other representatives of Cuadrilla. However, Caroline Lucas' request for details of the topics covered in these meetings were declined by the government on the grounds of not 'prejudicing the commercial interests of Cuadrilla' (Frack Off, 2013a: Online). Arguably, having a top executive working, and appointing key personnel, in government departments responsible for regulating and taxing its business was conducive to Cuadrilla's commercial interests, especially in terms of the implications for both its' and the UK shale sector's differential risk.

[61] The logic behind Riverstone's decision to install Lord Browne as Cuadrilla's chairman is illustrated by the following extract from a 2012 article in the Asian Venture Capital Journal: 'An investment in a start-up or early-stage oil and gas company is also an investment in the management team's ability to acquire assets in a particular geography. In addition to geological expertise, this requires a network of relationships with local governments, regulators and other operators that takes years to construct. It is no coincidence that the founders of many independent developers globally have previously served as senior regional executives for the oil majors' (Asian Venture Capital Journal, 2012: 7).

However, while the case of Lord Browne is especially notable, it is hardly exceptional. Indeed, as argued by Brock (2020: 3), the tireless research efforts of anti-fracking activists have rendered visible the 'depths of politico-economic fracking connections'. Consequently, it is now easier to discern how 'fracking is embedded in a complex web of personal and institutional relationships and vested interests that transcend state institutions, fracking firms, and investors' (ibid.). Here, it is worth recalling Nitzan and Bichler's (2009: 8) argument that

> the power to generate earnings and limit risk goes far beyond the narrow spheres of 'production' and 'markets' to include the entire state structure of corporations and governments…(T)he legal–organizational entity of the corporation and the network of institutions and organs that make up government are part and parcel of the same encompassing mode of power. We call this mode of power the *state of capital*, and it is the ongoing transformation of this state of capital that constitutes the accumulation of capital (Nitzan and Bichler, 2009: 8).

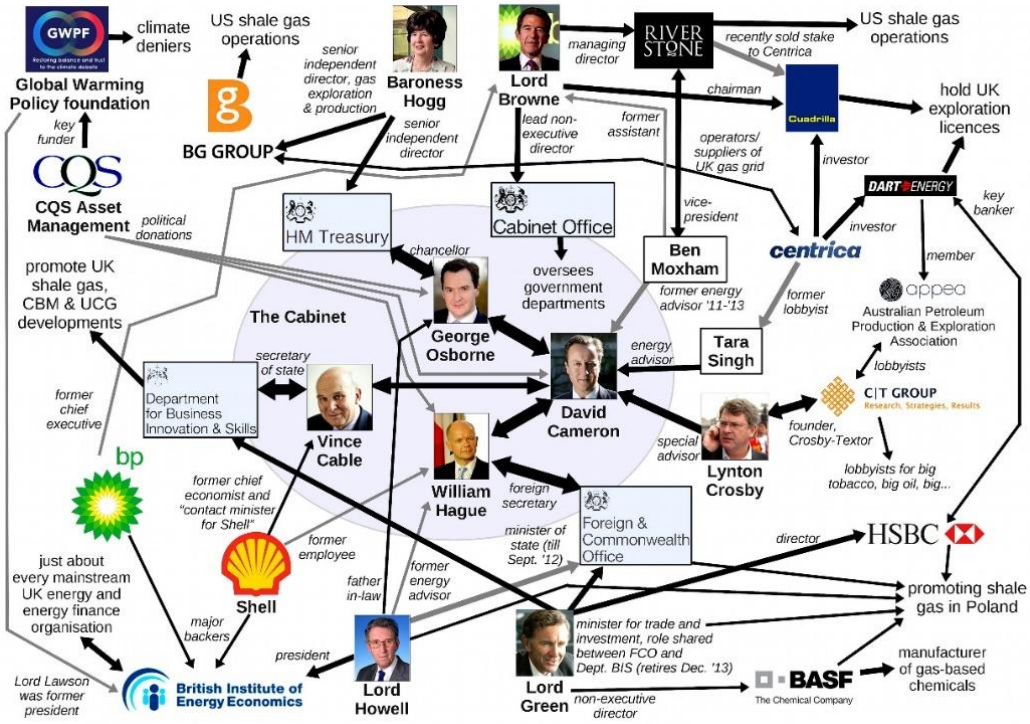


Figure 5.13 The UK State of Carbon Capital
Source: Mobbs, 2015: online

Combining the state of capital concept with Di Muzio's (2015) theory of *carbon capitalism (*especially the latter's argument that oil and gas corporations are amongst the most powerful globally), it could be argued that Figure 5.13 – borrowed from Mobbs (2015: Online) – depicts *the UK state of carbon capital*.[62] Namely, those 'corporation[s] and the network of institutions and organs that make up [the UK] government' whose 'power to generate earnings and limit risk' (Nitzan and Bichler, 2009: 8) is intimately tied to the continued extraction and monetisation of oil and gas (Di Muzio, 2015).

Although the differential risks of UK fracking investment arguably increased as the conflict progressed, the UK government's staunch support for the sector, especially during the early years of the conflict, arguably placed considerable downwards pressure on such risk. Indeed, to assuage investor concern on this front, firms such as AJ Lucas and IGas consistently emphasised the favourable political and policy environment surrounding UK fracking (e.g. IGas, 2014; AJ Lucas, 2015).

The UK government's efforts to reduce the differential risk of UK fracking investment were primarily focused on two strategic objectives: streamlining the national planning/permitting framework governing fracking while limiting the ability of local councils to reject planning applications; and the development of a generous fiscal regime to incentivise investment in the sector (Brock, 2020).[63] With the latter objective in mind, in March 2013 the UK Chancellor, George Osborne, announced that investors in UK fracking would benefit from 'the most generous [tax breaks] for shale in the world' (Bawden, 2013a: online). The following year, the government announced its intention for local councils to collect 100% of business rates generated by shale gas wells while also floating the idea of homeowners in the vicinity of fracking sites

[62] Figure 5.13 is borrowed from Mobbs' (2015: Online) research into 'the relationships between policy-makers, the oil & gas industry, and the finance and PR industries supporting them'. It represents Mobbs' first attempt to map these relationships back in 2013. Although Mobbs later developed a larger more comprehensive version of this map, it is so large and complex that it cannot meaningfully be interpreted in A4. For this reason, I have used the earlier more rudimentary version. The larger more comprehensive version can be found here: http://www.fraw.org.uk/meir/frackogram.html

[63] The following paragraphs draw heavily on Brock (2020).

receiving such revenues directly (UK Government, 2013). 2014 also saw the passage of legislation negating a previous requirement that homeowners should be individually informed of planning applications for drilling or fracking beneath their properties. At the EU level, the UK government also moved swiftly to veto proposals for more robust regulation of the shale gas sector. Back in the UK, the Infrastructure Act was signed into law in 2015. Contrary to the imperatives of climate change mitigation, this act of parliament created a legal requirement for the UK government, working in collaboration with the oil and gas industry, to maximise the economic recovery of UK petroleum as a principal policy objective. The act also mandated the right for persons to access deep-level land to access petroleum without the landowner's consent. Crucially for the oil and gas firms seeking to frack in the UK, the Act also permitted the 'passing [of] any substance through, or putting any substance into, deep-level land or infrastructure installed in deep-level land' (UK Parliament, 2015: 48). As noted by Brock (2020: 6), this latter clause effectively rendered 'it impossible for landowners to block fracking and [the] disposal of toxic waste under their land'. From the perspective of investors, these legislative changes helped make it cheaper, quicker, easier and thus less risky to undertake fracking in the UK.

The extent to which private fracking interests depended upon powerful government actors to reduce their differential risk is also well illustrated by the contents of a 2014 leaked letter from the UK Chancellor, George Osborne, to the Economic Affairs Committee. Within this letter, Osborne set out several key actions to be implemented by ministers for the purposes of accelerating the development of UK shale gas (Osborne, 2014). These actions included: exploring the potential for public land to be opened up for shale gas exploration; using the UK's influence in the EU to prevent 'the imposition of additional regulatory burdens' on fracking (ibid.: 5); lobbying Lancashire County Council planning authorities on Cuadrilla's behalf regarding the fracking company's planning applications to drill for shale gas in the county; and 'bei[ng] prepared for the risk that permission is turned down or progress injuncted' (ibid: 3). In case of this latter scenario, Osborne instructed ministers to support Cuadrilla's subsequent appeal by ensuring the Planning Inspectorate 'respond promptly to appeal

or SoS recovery if appropriate' (ibid.). The Planning Inspectorate is a government agency that, amongst other competencies, considers and frequently determines the outcome of planning appeals (The Planning Inspectorate, 2023). SoS (Secretary of State) recovery refers to when the Secretary of State for Communities and Local Government uses their discretionary powers to determine the outcome of planning applications, thus overriding the power of local authorities to make such determinations (Planning Aid England, no date: online). This situation is commonly described as 'calling the application in' (ibid.). The Secretary of State also has the power to 'recover' and determine the outcome of planning appeals that have been submitted to the Planning Inspectorate (ibid.). The UK government deployed these very powers in October 2016 when, following Lancashire County Council's 2015 rejection of Cuadrilla's two planning applications to explore for shale gas in the county, the Secretary of State intervened, reopening the Roseacre Wood planning enquiry while greenlighting drilling at Preston New Road (Vaughan, 2016a; Drill or Drop, 2019).

From 2014 onwards, with shale gas explorers struggling to gain local planning permission for their proposed sites, the pro-fracking coalition grew increasingly frustrated. For example, on 12 February 2014 the Times newspaper published an article under the following headline: "Planning delays 'hinder fracking'" (Forston, 2014). The chief source for this article was a consultancy report, commissioned by Cuadrilla, which argued that the current planning and permitting regime for shale gas was too slow and cumbersome (Pöyry, 2014). Consequently, without significant reform of this regime, the report argued, investors would conclude that the (differential) risks of UK shale gas investment were too great, and the sector would not realise its potential (ibid.). It did not take the UK government long to respond to these pro-fracking calls for action. Indeed, from 2015 onwards the UK government dedicated significant resources to the project of 'streamlin[ing] and simplify[ing] the permitting, approval and consent process' for shale gas projects (ibid.: 6). In 2015, the government announced its intention to intervene if councils failed to process shale gas applications within sixteen weeks (DECC and DCLG, 2015). As argued in Brock (2020), this change rendered it virtually impossible for councils to consider evidence

pertaining to health and safety, thus making it even harder for them to reject fracking planning applications. The government also changed the requirement for fracking companies to gain planning permission for certain fracking-related activities that had previously required such permission. For example, whereas water monitoring had previously been subject to local planning consent, companies were now just required to notify local authorities about this activity (Brock, 2020; DECC and DCLG, 2015).

In 2016, having secured an absolute majority in the 2015 general election, the Conservatives, freed from the compromises of coalition, dissolved the Department for Energy and Climate Change (DECC), transferring the latter's energy and climate brief to the newly created Department for Business, Energy and Industrial Strategy (BEIS). As the name suggests, BEIS' new remit, which notably includes business and industrial strategy, is considerably wider than DECC's. Although not necessarily problematic for UK climate action, in the context of the government's aggressive support for fracking, this move was interpreted by many as a further signal of the government's prioritisation of business interests over those of the climate and society (Brock, 2020; Vaughan, 2016c). Further evidence for this thesis came in 2017 when, in their election manifesto, the Conservatives proposed that fracking sites should be designated as nationally significant infrastructure. If enacted, this would entail the transference of fracking planning application decision-making powers from local councils to government appointees in the Planning Inspectorate (Conservative Party, 2017; Brock, 2020). In May 2018, the government announced their intention to adopt this policy alongside several other measures designed to accelerate the expansion, and thus reduce the differential risk, of UK shale gas investment. Most notably perhaps, beyond the proposal to designate fracking as nationally significant infrastructure, these measures also included a proposal for test drilling to be reclassified as permitted development. If enacted, the latter proposal would enable test drilling to proceed without companies having to first obtain planning permission. This announcement followed a series of setbacks for UK fracking as seven out of eight proposed sites were rejected by local councils in the first three months of 2018 (BEIS et al., 2018; Brock, 2020). Collectively, these setbacks served to increase the differential risk of UK shale

gas investment, while the UK government's subsequent, albeit ultimately aborted, moves to bypass local authorities and centralise decision-making powers regarding the determination of fracking planning applications sought to counteract this effect.

5.2.2.4 The anti-fracking coalition's fracking investment risk inflation drive (and the pro-fracking backlash)

> For this project to succeed Cuadrilla, which is burning through £15 million per year before even breaking ground, would need to gain not just the geological data to convince potential investors but also the "social data" to show that the economic risks associated with community resistance to fracking is not significant. This is where the anti-fracking coalition comes in…Where you live it is likely that the tentacles of this project reach into your region in some way, and you will have numerous opportunities to take action (Frack Off, 2019d: online).

While the pro-fracking coalition aggressively sought to reduce the differential risk of UK shale gas investment, the anti-fracking coalition aimed to achieve the very opposite. Just like their efforts to punctuate pro-fracking hype, anti-fracking activists sought to drive up shale gas investment risk as part a broader strategy to convince investors that UK fracking was an unviable business prospect. To this end, the UK anti-fracking coalition deployed a myriad of tactics across multiple arenas. As noted above, the planning and permitting regime for UK shale gas constituted an especially important arena of contention. I have already discussed how the pro-fracking coalition grew increasingly frustrated with local planning authorities for not processing/approving planning applications at the requisite speed; and the upward pressure this placed on differential risk. However, what remains to be explored is the crucial role of the anti-fracking coalition in influencing how local planning authorities dealt with shale gas planning applications during this period.

During my fieldwork, it soon became apparent just how much time, effort, and resources many anti-fracking activists had dedicated to fighting shale gas planning applications, often to the detriment of their own health, wellbeing, and finances. As one Lancashire-based interviewee explained:

> From October 2016, we had loads and loads of stuff like registering, putting proofs of evidence in and doing all the legal planning stuff. We had a legal team as well, and then we presented at the second Public inquiry which was in April 2018…As far as our community goes, it's actually cost us thousands of man-hours trying to deal with this in a planning terms, it's cost us tens of thousands of pounds to try and defend our community. And we've got people in our village who are on medication, because they're so stressed and concerned about the whole thing. So, it's been a very traumatic experience (Interviewee 16: Female; 62; Chair of a resident group; Frack Free Lancashire; Lives on Fylde.).

Here, the anti-fracking cause was aided by the fact that some areas targeted for fracking (e.g. on Lancashire's Fylde Coast and North Yorkshire) contained significant numbers of retired professionals; a demographic that, relatively speaking, are more likely to have the time, skills, and/or resources to successfully contest planning applications (e.g. Bassett et al., 2002; Matthews et al., 2014). The same arguably applies to legal challenges, another tactic deployed by anti-fracking activists in their fight to stop the expansion of the UK shale gas frontier. While some of these legal challenges sought to halt individual projects (e.g. Leigh Day, 2018; Vaughan, 2017; Cockburn, 2018), others contested government fracking policy more broadly (e.g. Vaughan, 2018b; Hayhurst, 2019c). Although most were unsuccessful in judicial terms, these legal challenges arguably helped increase the differential risk of UK shale gas investment. For example, in a 2017 investor presentation AJ Lucas cited a forthcoming legal challenge to the UK government's decision to grant Cuadrilla planning permission for its PNR exploration site in Lancashire as an instance of 'UK regulatory risk' (AJ Lucas, 2017: 33). According to AJ Lucas' analysis, if successful, this legal challenge could 'set aside some or all of the UK Government's planning permission' for its proposed PNR site (ibid.). Such an outcome could consequently prejudice the firms' UK shale gas investments by 'result[ing] in additional costs and extend[ing] the timeline for the

proposed exploration program at PNR' (ibid.). In the worst-case scenario, it could even 'preclude the proposed exploration program at PNR' (AJ Lucas, 2017: 33).

AJ Lucas' warning about the risks associated with increased costs and extended exploration timelines speaks to a specific vulnerability, shared by several key fracking investors, that the anti-fracking coalition exploited very effectively: namely, the fact that many of these investors were not investing in fracking for the long-term. For example, as argued by *Frack Off*:

> Cuadrilla is an unconventional exploration company which is burning through investment capital in the hope of kick-starting shale extraction in the UK and then selling out to a much larger company for a huge profit. They are not in the business of renting drilling rigs, or even producing oil or gas, but rather gathering the data they need to convince some major corporation to buy them out (Frack Off, 2013b: Online).

This understanding was seemingly shared by many of AJ Lucas' retail investors. Indeed, in online forum discussions, many of these investors regularly talked about their belief/hope that a large 'energy major' such as Shell or BP would acquire Cuadrilla and/or AJ Lucas and their interests in UK fracking. In this ideal scenario, AJ Lucas shareholders would be paid a premium for their shares, thanks to AJ Lucas' 45% stake in Cuadrilla and its 25% stake in the 'Bowland' shale gas license. The private equity firms that invested in UK fracking during this period appear to have been motivated by a similar strategy. For example, during a 2017 roundtable at the University of Texas a partner at Riverstone (the private equity firm that held a 45% stake in Cuadrilla between 2010 and 2020) described private equity's oil and gas investment model thus:[64]

> PE [private equity] investments can have a wholesale price advantage versus public stocks, but they also often entail more risk, more uncertainty about the eventual success of the deal. Diversification by PE firms of their "wholesale" investments helps manage that risk—and the larger PE firms can achieve this diversification, just by making a fairly large number of smaller investments…In addition, a private equity firm has to plan for exiting an investment at the same

[64] Although this quote specifically refers to private equity firms' investments in US fracking, the investment model described above arguably applies more broadly to include the sector's investments outside of the US.

> time as it is entering it, which can make its tactics and strategies different than those of public companies, which are designed as perpetual corporations. There is room in our industry for both models. And I think there's a special role for private equity in the oil and gas industry: our investments help build up the feeder system for larger public companies (Sheffield et al., 2017: 47).

Much like AJ Lucas then, Riverstone invested in Cuadrilla not to generate earnings through the production and sale of oil and gas, but to collect enough data to induce a larger publicly listed oil and gas firm to buy them out. This insight accords with Nitzan and Bichler's (2009) argument that mergers and acquisitions (i.e. internal breadth) represent dominant capital's favoured regime of differential accumulation. However, it also suggests that, to some degree at least, dominant capital's strategy of differential accumulation through mergers and acquisitions (i.e. internal breadth) relies on private equity firms (e.g. Riverstone) and other (less dominant) corporations (e.g. AJ Lucas) investing in higher risk greenfield growth (i.e. external breadth) projects on their behalf. As noted in the previous quote, one strategy private equity firms use to manage this elevated risk is through diversification. That is, by making many relatively small investments. For example, in 2010, when Riverstone invested $58 million in Cuadrilla this represented just 0.3% of the $17 billion the US private equity firm had under management at the time. Thus, whereas AJ Lucas arguably staked its future on Cuadrilla and UK fracking, for Riverstone this investment represented just a tiny fraction of their investment portfolio's risk exposure.

This begs the question of how long a private equity investor would typically plan to hold an oil and gas investment before seeking to achieve a successful exit. During a panel discussion at a 2017 oil and gas investment conference in London, an experienced private equity investor stated that they would aim to achieve such an exit after 'a five-year period' (121 Oil and Gas Investments, 2017: 17min 07). This is confirmed by recent analysis which found that, in 2020, the average time private equity firms held their investments was 5.4 years; an all-time high. A decade earlier, private equity's average holding time was just 3.8 years (Private Equity Wire, 2021). Considering these relatively short investment horizons, it becomes easier to discern how the planning delays and legal challenges discussed above could have significant

implications for the differential risk profile of UK shale gas investment. Interestingly, during an interview with onshore oil and gas news website, Drill or Drop, an Ineos spokesperson argued that they were less vulnerable to such anti-fracking risk inflation through delay tactics:

> We understand it's delay, delay, delay – that's what we see with some of the other operators. I understand it as a tactic but I don't really want to pay any quarter to it...A lot of the delaying tactics are around people having speculation around specific operators which they think don't have the cash, or they want to sell out because they're private equity owned, or they've got to give a return to their shareholders. We don't have any of those things (Hayhurst, 2017i: Online).

Although not explicitly stated, this Ineos spokesperson seems to be suggesting that Ineos' size, financial clout, and private ownership structure renders it less vulnerable to such tactics compared to some of their pro-fracking allies.

Beyond planning and legal battles, the anti-fracking coalition also made extensive use of non-violent direct-action tactics to drive up the differential risk of UK fracking. Non-violent direct-action tactics became especially important once a company had received planning permission to develop a particular site. These tactics, which took many forms, consisted of physical actions to disrupt, delay, and increase the costs of fracking. Like planning delays and legal challenges, these tactics also capitalised on capitalist vulnerability regarding the exactingly short time horizons of fracking investment. However, to capitalise on this latter vulnerability as a means of driving up the (differential) risk of UK fracking, the anti-fracking coalition's non-violent direct action tactics also exploited another important area of fracking business vulnerability: namely, the fact that each fracking site depended on a constant flow of heavy goods vehicles delivering and removing equipment, supplies, and waste products serviced by multiple suppliers and sub-contractors from depots located in different parts of the UK. This infrastructure, with its multiple bottlenecks and chokepoints (e.g. the entrances of fracking sites and supplier depos and the roads leading up to them), presented anti-fracking activists with numerous opportunities to delay, disrupt, and increase the costs of UK fracking, thus putting further upward pressure on the sector's differential risk. While Figure 5.14 provides a visual illustration of the fracking business'

infrastructural vulnerability, Figure 1.6 (reproduced again below) pithily summarises the ultimate goal of the direct-action tactics that aimed to exploit this vulnerability.

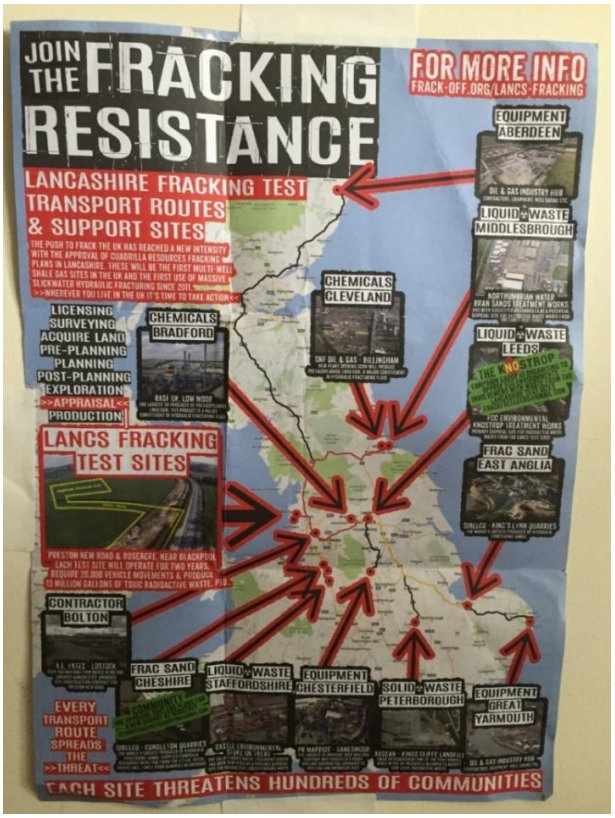


Figure 5.14 Frack Off poster: The infrastructural vulnerability of UK fracking
Source: Author's photograph, 2018

Figure 1.6 The goal of anti-fracking disruption tactics
Source: Author's photograph, 2018

I witnessed many of these tactics first-hand during my fieldwork with anti-fracking activists in Lancashire (March 2018-November 2019), who were engaged in a campaign to disrupt Cuadrilla's shale gas exploration activities at PNR near Blackpool in Lancashire. These tactics included: groups of activists standing or sitting in front of the entrance to the site to prevent vehicles from entering and leaving (see Figure 5.15); 'slow walking', whereby activists walking slowly in the road to delay delivery vehicles (see Figure 5.16); 'lorry surfing', which involved activists scaling and remaining on top of delivery vehicles, usually for an extended period until the police remove and arrest them (see Figure 5.17); 'lock-ons', which involve activists blocking access to fracking infrastructure by attaching themselves to a device encased in a plastic tube, surrounded by concrete, metal, and a variety of materials, usually remaining there until a specialist team of police officers 'cut them out' and arrest them (see Figure 5.18).

Figure 5.15 Activists congregating outside the entrance to Cuadrilla's PNR exploration site in Lancashire
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.16 Activists slow-walking lorries outside Third Energy's shale gas exploration site at Kirby Misperton, North Yorkshire
Source: Spy, 2017
Note: Photograph blurred for anonymisation purposes.

Figure 5.17 Activist 'surfing' lorry outside Cuadrilla's PNR exploration site
Source: FargoDaVille ITNOTD, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.18 Lancashire Police protester removal team 'cutting out' activist from caravan lock-on outside the entrance to Cuadrilla's PNR exploration site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

During my time at PNR I also bore witness to Lancashire Police's extensive policing operation which sought, frequently through aggressive and violent tactics, to thwart anti-fracking efforts to disrupt Cuadrilla's activities. While Figure 5.19, Figure 5.20, Figure 5.21, Figure 5.22, Figure 5.23, Figure 5.24, Figure 5.25, Figure 5.26, and Figure 5.27 provide a flavour of this policing operation, they do not adequately capture its scale, aggressiveness, or the distress, pain, animosity, and disillusionment it provoked in many of those on the receiving end. The overarching logic of this operation is arguably captured by the following fragment from one female anti-fracking activist and local councilor I interviewed:

> On the whole, I think the [police] units when they come down, they are told their job is, 'Get those lorries in and get these protesters out of the way.' And that's their briefing, and I don't think they see us as somebody's mum, somebody's daughter, somebody's wife. They see us just as somebody who is obstructing a delivery. And so, it's easy then for them then to just sweep us out of the way…I just think they are being used -- they are being used by government to, basically, be glorified security guards (Interviewee 6: Female anti-fracking activist and Parish Councillor, 49, Kirkham, Lancashire).

Figure 5.19 Lancashire Police physically moving anti-fracking activists from the PNR site entrance
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.20 Lancashire Police detaining anti-fracking activists in preparation for the arrival of a convoy of lorries to PNR.
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.21 Police officer physically restraining anti-fracking activist on PNR
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.22 Lancashire Police facilitating another delivery to Cuadrilla's PNR site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.23 Lancashire Police facilitating the removal of fracking equipment from Cuadrilla's PNR site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.24 Lancashire Police detaining activists to facilitate another delivery to Cuadrilla's PNR site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.25 Police vans parked in middle of PNR to facilitate another delivery to Cuadrilla's site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.26 Lancashire police preparing to facilitate the entry of another lorry convoy into Cuadrilla's PNR site
Source: Author's photograph, 2018
Note: Photograph blurred for anonymisation purposes.

Figure 5.27 Police surveilling anti-fracking activists outside Cuadrilla's PNR site
Source: Author's photograph, 2018.
Note: Photograph blurred for anonymisation purposes.

During my time at PNR, I witnessed numerous instances of police violence. This violence included police officers pushing, shoving, grabbing, dragging, and even rugby tackling anti-fracking activists to prevent them from disrupting Cuadrilla's work. The following excerpt from my research diary provides an insight into these violent tactics (as I perceived them at the time):

> *Today, I witnessed police officers assault anti-fracking activists. Many activists I've spoken to understand that when they attempt to put their bodies in the way of moving lorries, the police are going to try and stop them. Afterall, the police are supposedly there 'to facilitate peaceful protest' and frequently grab hold of protesters 'for their own safety'. However, when they rugby tackle someone to the ground, banging their head on the floor and then jump on top of them; or throw someone into a fence, cutting their nose; or twist someone's arm behind them, just after being told that that person is recovering from a fractured shoulder and then throw them face down on the floor and lean on their back, it becomes difficult to maintain the line that protester safety is the main concern. I witnessed all these things today. They were all done while the police performed their principal function of allowing Cuadrilla 'to go about its lawful business'* (Diary extract).

While police officers frequently used force to move and/or detain activists engaged in non-violent disruptive forms of protest, they frequently also deployed these tactics preemptively against those whom they suspected might engage in such activities. I also witnessed numerous examples of activists being arrested, typically for 'obstruction of the highway'. I also learned how the police frequently put pre-charge bail conditions on arrested activists, stipulating that they could not go to certain places (usually in the vicinity of fracking/protest sites). As argued by one interviewee from the Network of Police Monitoring (Netpol), such bail conditions are frequently used as a police tactic to 'disrupt[] the effectiveness of protest' (Interviewee 11). I also witnessed, and learned, how many of these tactics were frequently not applied equally, with certain groups of activists being policed more intensively and aggressively against others. For many of my interlocuters, these differentiated policing tactics, which also characterised policing operations by other forces at other fracking sites (e.g. Gilmore et al., 2016; NetPol, 2016; NetPol, 2017; Jackson et al., 2019), formed part of a broader strategy to divide, delegitimse, and thus undermine the effectiveness of the anti-fracking coalition.

Beyond these first-hand experiences of police violence and surveillance, the weight of evidence would appear to support such analysis. This evidence includes: police forces and fracking companies signing memoranda of understandings to collaborate on policing operations (Netpol, 2014; Gilmore et al., 2016); intelligence sharing between fracking companies and police forces on anti-fracking activists (Rose, 2014); Lancashire police sending disabled anti-fracking activists' details to the Department for Work and Pensions (DWP) (Rahim, 2018); Ineos' multiple meetings with police forces in North Yorkshire and Humberside to discuss how they might liaise to ensure 'the safe and successful delivery of' the firms' exploration projects (SpinWatch, 2017: Online); and, perhaps most worryingly, the revelation that multiple UK police forces had produced training materials under 'Prevent' (the government's counter terrorism strategy) that designated anti-fracking activism as an example of 'domestic extremism' (Gilmore et al., 2020). While these materials fail to clearly define this category, neither do they

provide ‘evidence of the apparent threat posed by anti-fracking campaigns’ (ibid.: 361).

As illustrated by the Mail Online headline in Figure 5.28, this framing of anti-fracking activists was also deployed by right-wing media outlets close to the ruling Conservative party. That is not to say that everyone in the anti-fracking coalition was beyond reproach and had never done anything objectionable. However, as a social movement overwhelmingly underpinned by a commitment to non-violence (including those who engaged in non-violent direct-action tactics), there is arguably little justification for equating anti-fracking activism with terrorism or extremism. Nevertheless, from the perspective of the pro-fracking coalition, the ‘threat posed by anti-fracking campaigns’ is clear enough (ibid.). For these campaigns, and their strategy of driving up the risk of UK fracking investment through non-violent direct action, posed a significant threat to such investments. As the Mail Online headline indicates (Figure 5.28), discourses equating these tactics with extremism arguably provided a useful pretext for the police to ‘step up [their] efforts’ to combat anti-fracking activism.

Figure 5.28 Media vilification of anti-fracking activists as ‘criminals, crackpots and extremists’
Source: Rose, 2017

This threat posed by anti-fracking activists to the UK fracking sector's differential risk is partially illustrated by Table 5.1 (below). This table details specific work stages of Cuadrilla's drilling/fracking program at PNR, the firm's publicly stated timetable for completing these works, and the extent to which these were delayed. Of course, other factors beyond the anti-fracking protests would also have contributed to these delays. For example, Cuadrilla experienced significant challenges relating to the PNR site's drainage system, which resulted in environmental permit breaches and possible delays while remedial action was taken to remove water from the site (e.g. Hayhurst, 2017e, 2017f). Relatedly, there is also some evidence of Cuadrilla's works being delayed by inclement weather (e.g. Hayhurst, 2018j). Nevertheless, whatever other factors might have also played a role, I would argue that the anti-fracking protests targeting Cuadrilla's PNR site and suppliers were a key driver of the delays highlighted in Table 5.1.

Table 5.1 Fracking delays at Preston New Road (PNR)

Stage/activity	Planned dates	Actual dates	Length of delay
Site construction and preparation	January -March 2017	January- July 2017	3-4 months
Two wells drilled (PNR1 and PNR2)	First half of 2017	July 2018	14-19 months
Fracking and flow testing of two horizontal wells (PNR1 and PNR2).	Second half of 2017	Fracking of PNR1: October 2018-December 2018. Abandoned following earthquakes. Fracking of PNR2: August 2019-September 2019. Fracking suspended by the Oil and Gas Authority following more earthquakes.	Fracking commenced 15 months behind schedule and was never completed

Sources: Lucas Drilling, 2016; Frack Off, 2017; BBC News, 2017b; Drill or Drop, 2022

Cuadrilla had originally planned to drill two horizontal wells at PNR in the first half of 2017. In the second half of 2017, Cuadrilla planned to frack, and flow test these wells to ascertain whether gas could be extracted in large enough quantities to move beyond the exploration stage to production. However, this is not how the project unfolded. In the face of daily protest and countless instances of non-violent direct action, which frequently served (despite the police and Cuadrilla's security's best efforts) to disrupt Cuadrilla's activities, drilling works were finally completed in July 2018 (more than a year behind schedule). Fracking and testing work deviated even further from the proposed schedule. The first fracking attempt of PNR1 began in October 2018 (over a year behind schedule) and had to be abandoned in December 2018 after precipitating several earthquakes. Fracking (this time of PNR2) resumed in August 2019 (over two years behind schedule). As discussed previously, this second round of fracking at PNR precipitated more earthquakes, which resulted in the suspension of fracking and the government's decision to impose a moratorium. Reflecting on anti-fracking activists' role in the delays outlined above, one interviewee had the following to say:

> Despite all their public and denials, they were saying 'We are on course, we are on course'. That's clearly an outrageous whopper. They're massively behind schedule. We've cost them between us millions. We've cost the police millions and therefore the government millions, well therefore us as the taxpayers millions, I suppose [laughs]. But we've constantly been underestimated by our opponents, and I take some comfort from that. They will continue to underestimate us, and we will continue, frankly, to run rings around them. It's just keeping the faith, and I really do believe we will win (Interviewee 5: Male, 57, Retired Civil Servant, Frack Free Lancashire, Fylde).

The fracking companies essentially conceded many of these points when, from 2017 onwards, they began seeking draconian civil injunctions to prevent anti-fracking activists from engaging in many of the disruptive protest tactics that were proving so effective at PNR and elsewhere. The first to do so was Ineos. Citing industry-wide concerns regarding 'the risks posed by militant activists', an Ineos security consultant revealed in court that this decision was taken following police advice during a meeting

between senior fracking industry representatives and senior officers (Evans, 2017: Online). As reported in the Guardian, this meeting was attended by 'a secretive [police] unit that monitors campaigners' (ibid.). In September 2017, Ineos, who had yet to begin work at any of their proposed sites, were granted an unprecedentedly broad injunction aimed at 'persons unknown'. This injunction, which covered eight specific locations, subcontractors, depots, routes to planned sites, operations and equipment, specifically prohibited common anti-fracking tactics such as mounting vehicles and slow walking. The terms of this injunction also covered private nuisance, trespass, harassment and combining to commit unlawful acts, obstruction of the highway, and interference with rights of way over land (Hayhurst, 2023b). Similar injunctions were subsequently obtained by Cuadrilla and UKOG (Evans, 2017; Hayhurst, 2020e). Anyone found in breach of these injunctions could be liable to being jailed, fined, or having their assets seized (Hayhurst, 2023b); punishments significantly harsher than those anti-fracking activists had previously risked incurring through their tactics of non-violent direct action. For example, at the time, the maximum penalty for obstructing the highway was £1000.[65] Typically, however, those found guilty would receive a smaller fine or a conditional discharge (Hayhurst, 2017g).[66] Reflecting on Ineos' injunction, Gilmore et al (2020: 380) note how it

> was the first in UK court history to pre-emptively restrict future protest activity based on an alleged industry-wide risk to fracking companies rather than an imminent and real risk to a particular person or site.

While this and subsequent injunctions ostensibly sought to neutralise the financial/business risks posed by anti-fracking activism, how exactly did the police, fracking companies, and the latter's legal representatives expect this outcome to be

[65] It is beyond the scope of this study to explore events after December 2020. However, it is worth noting that following the passage of the Police, Crime, Sentencing and Courts Act in April 2022 highway obstruction became an imprisonable offence. Meanwhile, The Public Order Act, which became law in May 2023, made 'locking-on' an imprisonable offence while giving the police sweeping new powers to curtail protests. I will briefly discuss these developments in the Postscript (Netpol, 2022).

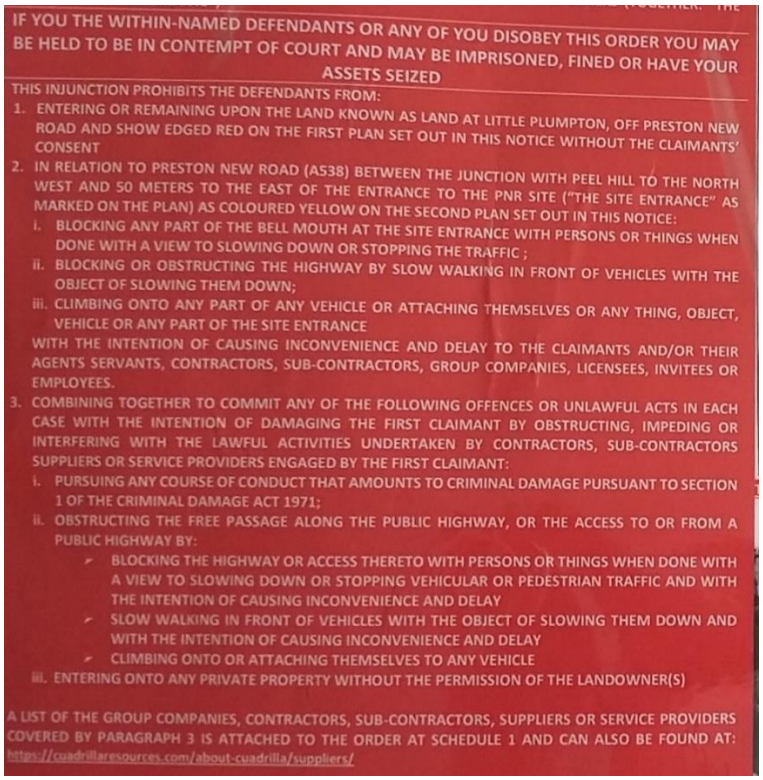
[66] According to the CPS (2022: online), a conditional discharge involves the 'offender' being 'released and the offence registered on their criminal record. No further action is taken unless they commit a further offence within a time decided by the court (no more than three years)'.

achieved? For many of my interlocuters, a key goal of these injunctions was – through the threat of harsh punishments for those found to have broken them (e.g. see Figure 5.29 and Figure 5.30 – was to intimidate anti-fracking activists into acquiescence. As explained by one interviewee:[67]

> The aim is to make people like me stop protesting because the threat of civil action against you which carries a lot of more punitive financial effects is quite daunting. Those of us who have a lifestyle where we live in a home and we have assets and we wanted to pass those assets to our children because that's the only thing we've got pass to them. And the thought of losing that in a civil action, for stepping over the line or doing something, it's quite worrying really. It's preventative, and I think that's what it was designed for. It was meant to put people off (Interviewee 6: Female anti-fracking activist and Parish Councillor, 49, Kirkham, Lancashire).

Figure 5.29 Notice of high court order/Cuadrilla's interim injunction left on PNR in June 2018
Source: Author's photograph, 2018

[67] Cuadrilla were granted an interim injunction on 1 June 2018.


IF YOU THE WITHIN-NAMED DEFENDANTS OR ANY OF YOU DISOBEY THIS ORDER YOU MAY BE HELD TO BE IN CONTEMPT OF COURT AND MAY BE IMPRISONED, FINED OR HAVE YOUR ASSETS SEIZED

THIS INJUNCTION PROHIBITS THE DEFENDANTS FROM:

1. ENTERING OR REMAINING UPON THE LAND KNOWN AS LAND AT LITTLE PLUMPTON, OFF PRESTON NEW ROAD AND SHOW EDGED RED ON THE FIRST PLAN SET OUT IN THIS NOTICE WITHOUT THE CLAIMANTS' CONSENT
2. IN RELATION TO PRESTON NEW ROAD (A538) BETWEEN THE JUNCTION WITH PEEL HILL TO THE NORTH WEST AND 50 METERS TO THE EAST OF THE ENTRANCE TO THE PNR SITE ("THE SITE ENTRANCE" AS MARKED ON THE PLAN) AS COLOURED YELLOW ON THE SECOND PLAN SET OUT IN THIS NOTICE:
   i. BLOCKING ANY PART OF THE BELL MOUTH AT THE SITE ENTRANCE WITH PERSONS OR THINGS WHEN DONE WITH A VIEW TO SLOWING DOWN OR STOPPING THE TRAFFIC ;
   ii. BLOCKING OR OBSTRUCTING THE HIGHWAY BY SLOW WALKING IN FRONT OF VEHICLES WITH THE OBJECT OF SLOWING THEM DOWN;
   iii. CLIMBING ONTO ANY PART OF ANY VEHICLE OR ATTACHING THEMSELVES OR ANY THING, OBJECT, VEHICLE OR ANY PART OF THE SITE ENTRANCE

   WITH THE INTENTION OF CAUSING INCONVENIENCE AND DELAY TO THE CLAIMANTS AND/OR THEIR AGENTS SERVANTS, CONTRACTORS, SUB-CONTRACTORS, GROUP COMPANIES, LICENSEES, INVITEES OR EMPLOYEES.
3. COMBINING TOGETHER TO COMMIT ANY OF THE FOLLOWING OFFENCES OR UNLAWFUL ACTS IN EACH CASE WITH THE INTENTION OF DAMAGING THE FIRST CLAIMANT BY OBSTRUCTING, IMPEDING OR INTERFERING WITH THE LAWFUL ACTIVITIES UNDERTAKEN BY CONTRACTORS, SUB-CONTRACTORS SUPPLIERS OR SERVICE PROVIDERS ENGAGED BY THE FIRST CLAIMANT:
   i. PURSUING ANY COURSE OF CONDUCT THAT AMOUNTS TO CRIMINAL DAMAGE PURSUANT TO SECTION 1 OF THE CRIMINAL DAMAGE ACT 1971;
   ii. OBSTRUCTING THE FREE PASSAGE ALONG THE PUBLIC HIGHWAY, OR THE ACCESS TO OR FROM A PUBLIC HIGHWAY BY:
      - BLOCKING THE HIGHWAY OR ACCESS THERETO WITH PERSONS OR THINGS WHEN DONE WITH A VIEW TO SLOWING DOWN OR STOPPING VEHICULAR OR PEDESTRIAN TRAFFIC AND WITH THE INTENTION OF CAUSING INCONVENIENCE AND DELAY
      - SLOW WALKING IN FRONT OF VEHICLES WITH THE OBJECT OF SLOWING THEM DOWN AND WITH THE INTENTION OF CAUSING INCONVENIENCE AND DELAY
      - CLIMBING ONTO OR ATTACHING THEMSELVES TO ANY VEHICLE
   iii. ENTERING ONTO ANY PRIVATE PROPERTY WITHOUT THE PERMISSION OF THE LANDOWNER(S)

A LIST OF THE GROUP COMPANIES, CONTRACTORS, SUB-CONTRACTORS, SUPPLIERS OR SERVICE PROVIDERS COVERED BY PARAGRAPH 3 IS ATTACHED TO THE ORDER AT SCHEDULE 1 AND CAN ALSO BE FOUND AT: https://cuadrillaresources.com/about-cuadrilla/suppliers/

Figure 5.30 Notice of high court order (zoomed in) left on PNR in June 2018
Source: Author's photograph, 2018

When these injunctions started being granted there was a great deal of dismay amongst activists that private companies could leverage the legal system to curtail protest rights in this way. Some activists have taken the brave step of challenging these injunctions in court, thus adding their own names to the list of defendants alongside 'persons unknown'. However, as one interviewee from NetPol explained, such challenges face an uphill struggle to achieve an outright 'win' owing to the inherent bias of the legal system in favour of business:

> You don't win in court against business, because the courts are there to protect property and business rights. All you can do is try and limit, in some way, the scope of injunction (Interviewee 11: Netpol).

This became apparent on 11 July 2018 when, from the gallery of the High Court of Justice Business and Property Courts in Manchester, I witnessed Cuadrilla's barrister (seemingly effortlessly) persuade a judge to extend the fracking firm's interim injunction until June 2020. Cuadrilla had been granted an interim injunction the

previous month (Hayhurst, 2018k), and this hearing provided activists with an opportunity to challenge this. However, while two campaigners did take on this challenge, they were not able to secure legal representation, further tipping the scales in Cuadrilla's favour. As highlighted by this extract from my research diary, the power imbalance between Cuadrilla and its anti-fracking opponents in this arena was starkly obvious:

> *Where is power? Yesterday, it seemed to be located in the 'business and property' court in Manchester, wielded by the judge and Cuadrilla's legal team. Beyond the favourable laws that enable corporations to use injunctions against their opponents in this way, Cuadrilla has an expert legal team and barrister behind them. The anti-fracking defendants have none of these things. During the hearing, I struggled to follow what was happening at times due to the legalistic language in which it was conducted. Many activists I spoke with said the same. Of course, this wasn't the case for Cuadrilla's barrister, who was of course fluent in this idiom of power. The inherent function of the 'business and property court' (i.e. to protect business and property) was made abundantly clear when, ruling in Cuadrilla's favour, the judge argued that 'the right to property and its enjoyment' trumps the 'qualified rights of protest'* (Diary extract).

Welcoming this decision, Cuadrilla's CEO, Francis Egan, released the following statement:

> We believe that this is an important deterrent to unlawful protest that has significantly disrupted and inconvenienced local commuters and businesses over many months. We have seen a welcome reduction in unlawful behaviour since the interim injunction was granted last month. We continue to respect lawful and peaceful protest, but will not hesitate to take legal action against those that breach the injunction with unlawful activity directed against us or our listed suppliers (Hayhurst, 2018l: Online).

This statement could simultaneously be interpreted as: a warning to anti-fracking activists to not dare break the injunction; and a signal to investors that, through this injunction, Cuadrilla had taken significant steps to combat the threat posed by anti-fracking activism, thus reducing its differential risk. However, it would not be long before disruptive protests would return to PNR.

5.2.3 Fracking power struggles as driver of autocatalytic sprawl

Before I explore how the anti-fracking coalition responded to Cuadrilla's injunction, it is worth recalling Bichler and Nitzan's (2017) arguments (discussed in Section 3.2.4) regarding the dialectical relationship between capitalist hierarchy formation, (capitalist) power imposition and sabotage, social resistance, and energy capture/use. Building on Fix (2017), Bichler and Nitzan (2017) argue that, since capitalists are compelled to augment their power (relative to other capitalists), this generates incessant competition to build increasingly large hierarchical organisations. Alongside growing corporate hierarchies, this process also involves the expansion of hierarchies in organisations and institutions whose power is frequently capitalised by private business (e.g. government organs/institutions, police forces, armies, courts, legal systems etc.), even though they are not typically considered part of capital (ibid.). Furthermore, since hierarchical power invariably sparks resistance from those on whom it is imposed, capitalists must construct even greater hierarchies and inflict ever more sabotage to combat such resistance (ibid.). Moreover, as Bichler and Nitzan argue, the proliferation of hierarchical power/sabotage are largely self-perpetuating, producing a phenomenon identified by Ulf Martin (2016) as 'autocatalytic sprawl'. Autocatalytic sprawl can be understood as a positive feedback loop where each subsequent attempt at hierarchy formation and sabotage generates ever-greater complexity and demand for energy. As noted previously, however, these dynamics are not the result of some grand capitalist plan (Bichler and Nitzan, 2017). Rather, they are typically driven by conflicts between competing coalitions organising to achieve their (narrowly) perceived goals in particular times, places, and contexts (ibid.). Moreover, not only are many of these power plays reactive (e.g. to a perceived threat to power), but they are also additive to a prior complexity. This prior complexity can further be understood as a product of earlier rounds of hierarchy formation, sabotage, and resistance by myriad organisations and actors (ibid.). These dynamics are depicted in Figure 3.3, which is reproduced again below.

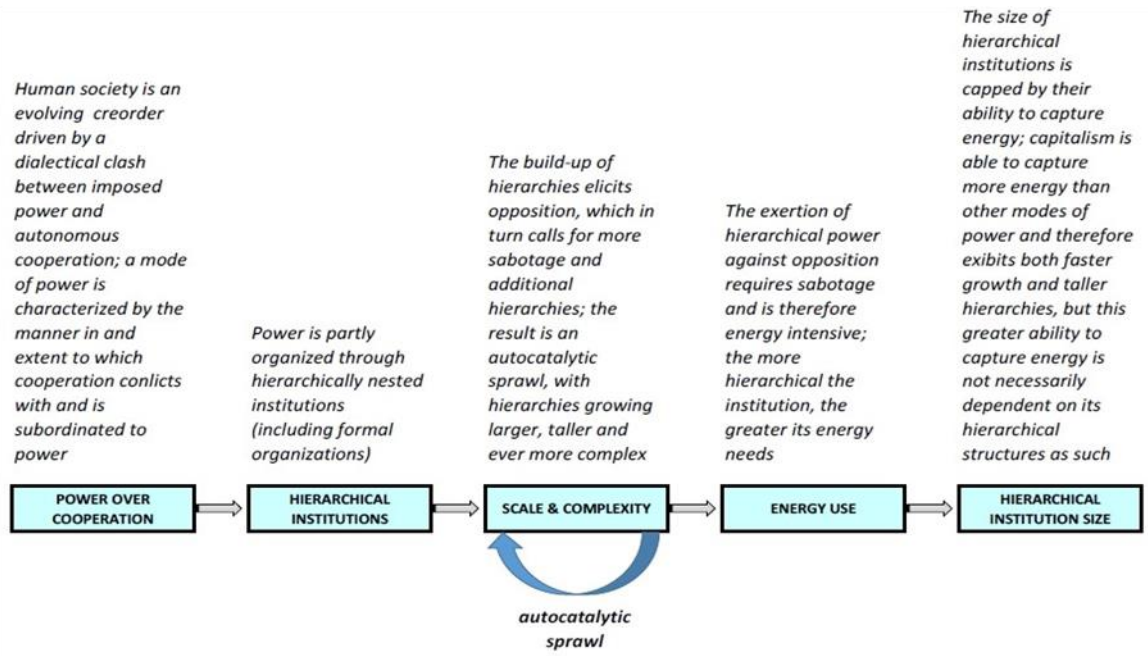


Figure 3.3 From Hierarchical Organisations to Energy Capture
Source: Bichler and Nitzan, 2017: 32

Arguably, the dynamics described above were powerfully present throughout the UK fracking conflict. The pro-fracking coalition's attempts to impose fracking on communities with minimal consultation or regard for public opinion precipitated strong resistance and the rapid proliferation of anti-fracking activism. The threat this activism posed to the fracking business prompted multiple (attempted) impositions of hierarchical power and sabotage by the pro-fracking coalition, prompting more resistance, which were subsequently met with further impositions of hierarchical power (and so on). For example, in 2016 the UK government deployed its power to greenlight Cuadrilla's exploration activities at PNR, overruling Lancashire County Council's previous decision to reject this proposed fracking site. This imposition of power, which was regarded by many of my interlocuters as an unjust sabotaging of local democracy, arguably served as a potent recruitment tool for the anti-fracking coalition while simultaneously radicalising many of those already involved. For example, on 3 July 2017 three local councilors and several other local activists participated in a 13-person lock-on blocking the entrance to Cuadrilla's PNR site for

several hours. For most of those involved, this was the first time they had undertaken this form of protest. As illustrated by the following quote from one of these local councillors, the government's overruling of local democracy to impose fracking on Lancashire was a key motivating factor for this action (see also Figure 5.31, below):

> It's abundantly clear that when it comes to fracking, local councils have been rendered weak and helpless. I feel I need to be here with the community to say that we won't roll over and accept this. We are putting our bodies on the line because our voices haven't been heard (Hayhurst, 2017h: Online).

Figure 5.31 'Lancashire voted no fracking here'
Source: Author's photograph, 2018

As outlined previously, the success of these anti-fracking tactics of non-violent direct action prompted strong responses from the government, the police, and fracking corporations; that is, more impositions of power/sabotage, which frequently prompted anti-fracking activists to escalate their protests and direct action. Thus, while the pro-fracking coalition arguably hoped their deployment of civil injunctions would go a long way towards subduing the anti-fracking coalition (thus reducing the differential risk of UK fracking investment), this did not come to pass. On the contrary, these injunctions, and the feelings of injustice and resentment they fostered, arguably stiffened the anti-fracking coalition's resolve to continue fighting. This is illustrated by

the following quote from one of my anti-fracking interviewees, when asked about whether the injunction had deterred people from protesting:

> No. I don't think it has [laughs]. There were about two weeks when people didn't really know what the injunction entailed. There were a lot of people looking at each other and we thought, 'Well, we're not going to be put off. We are still going to be here with our placards, we are still going to be here doing this, that and the other'. And so, I think people have been emboldened by it thinking, 'Well actually what can they do?'…But it hasn't stopped the lock-ons, and it hasn't stopped people getting in front of the lorries, and it hasn't stopped us occupying the bell mouth, and it hasn't stopped us contacting suppliers…So it's a very expensive piece of paper they've got there (Interviewee 6: Female anti-fracking activist and Parish Councillor, 49, Kirkham, Lancashire).

The first serious challenge to this injunction came on 24 July 2018, less than two weeks after a high court judge had extended it to 2020, when six activists locked-on outside the entrance to Cuadrilla's PNR site (Hayhurst, 2018m). This act of defiance prompted Cuadrilla to make good on its threats of legal action against would-be injunction breakers by bringing a civil case against three of these activists for contempt of court. The three activists were each given suspended prison sentences of four weeks (suspended for two years) for the lock-on, while one was sentenced to an additional two months (suspended for two years) for other injunction breaches (Hayhurst, 2019d). In January 2020, this additional sentence was reduced to four weeks by the court of appeal, which provided clearer guidelines for sentencing in such cases. According to this judgement, when sentencing in such cases of non-violent civil disobedience, judges should show 'greater clemency' on account of the moral convictions that drive campaigners to break the law. However, on the more substantive argument underpinning this appeal against Cuadrilla's injunction, that its terms were insufficiently clear to be understood by those without legal expertise, the court ruled in Cuadrilla's favour (Drill or Drop, 2020f). Nevertheless, given the media coverage and controversy surrounding this case (e.g. Pidd, 2019a, 2019b; BBC News, 2019a, 2019b; Walker, 2020), which was fought in a context of wider controversy surrounding Cuadrilla's fracking-induced earthquakes at PNR (e.g. BBC, 2018; Wharton, 2018; Halliday, 2019b; Sky News, 2019) and the subsequent moratorium (UK Government, 2019), this legal victory was arguably a pyric one for Cuadrilla.

5.3 Power struggles over the future of carbon capitalism and petro-market civilisation

Viewed through the lens of Di Muzio's (2015) work, the UK fracking conflict might usefully be understood as a struggle over the future of 'carbon capitalism and its concomitant petro-market civilization' (p. ix).[68] However, before proceeding with this argument, it may be useful to briefly revisit these key concepts. Di Muzio's theory of carbon capitalism is underpinned by the following insight: without accessible, affordable, and abundant fossil fuels, the universalisation and magnitude of capital accumulation, and energy profligate patterns of social reproduction, would have been unattainable (ibid.). Meanwhile, building on Gill's (1995) concept of market civilisation, Di Muzio defines carbon capitalism's accompanying petro-market civilisation as

> an historical and contradictory pattern of civilizational order whose social reproduction is founded upon nonrenewable fossil fuels, mediated by the price mechanism of the market and dominated by the logic of differential accumulation (ibid.: 5).

He argues that while 'capital is the central institution of petro-market civilization', its planetary-scale accumulation is crucially dependent on 'surplus fossil fuel energy' and the ongoing ability of capitalists to shape global patterns of social reproduction (ibid.: 5). Di Muzio also argues that, in the struggle to shape global patterns of social reproduction and accumulate differentially, the oil and gas business is amongst the most powerful. Although Di Muzio does not use this term, in this section I refer to those capitalist interests most heavily invested in the oil and gas sector as *carbon capital*.

Each constituent of the pro-fracking coalition (e.g. Cuadrilla, AJ Lucas, Riverstone Ineos, IGas, the UK Government etc.) undoubtedly sought to further their own particular interests through UK fracking. However, through their discursive-material support for the continued extraction, monetisation, and burning of fossil fuels, these pro-fracking actors simultaneously served as advocates for carbon capital more

[68] As outlined in Chapter 3, Di Muzio's (2015) theory of carbon capitalism draws heavily on Nitzan and Bichler's (2009) CasP approach (see Section 3.2.1).

broadly. More than any other group, the constituents of carbon capital are arguably united by a shared interest in the ongoing reproduction of carbon capitalism and the petro-market civilisation with which it, and their power, are ultimately intertwined.

However, informed by the existential threat of climate breakdown, the anti-fracking argument that fossil fuels must be 'kept in the ground' (e.g. see Figure 5.32) directly challenges this power. More fundamentally, perhaps, by rejecting their energetic foundations, such arguments, also question the future viability of carbon capitalism and its concomitant petro-market civilisation. I will now explore how, as the UK fracking conflict progressed, it increasingly came to be understood as forming part of a broader (set of) struggle(s) over the future trajectory of the global political economic/socio-ecological order.

Figure 5.32 Anti-fracking billboard on PNR, Lancashire
Source: Author's photograph, 2018

5.3.1 Knowing carbon capital(ism) through struggle

A key finding from my fieldwork concerns the hard-won collective learning that accompanied anti-fracking activists' power struggles with carbon capital.[69] Many of my interlocuters were initially drawn into anti-fracking activism due to concerns regarding fracking's immediate impacts. However, during their clashes with carbon capital, and encounters with other campaigners engaged in similar struggles (both nearby and far away), anti-fracking activists frequently underwent a journey of discovery. In doing so, they began to draw connections between their conflict, those being fought by others, and the broader political economic context. As one interviewee explained:

> Fracking is such a classic example in which it doesn't take long for it to become clear how much more of the government's ear, the vested industry interests have and how skewed the system is in their favour, and what a sham democracy can, at times, turn out to be. So, the decision to override local democracy in the case of Preston New Road is one case in point. And once the scales have fallen from people's eyes around something like that, then we often start to see various other veils fall left, right and centre in a similar way…For instance the policing that people witness at fracking sites and the sort of brutality that happens…That can suddenly cause a jolt to the whole world view that assumed a system for instance of justice and fairness turns out to be something else. Or people start to look a bit more into local environmental concerns, which leads to a sense of connectivity with issues and struggles around the world where people who are protesting against mining in South America. Or, switching on to climate change and climate justice and recognising the vast inequities and inequalities and the reality of the impact of climate change being felt so much more strongly by those in the Global South who have done the least to cause it (Interviewee 24: Grassroots and NGO fracking activist).

This process of learning through struggle frequently afforded UK anti-fracking activists privileged insights into the power of carbon capital; especially in the UK context.[70] As discussed previously, through their engagement with fracking and energy issues, activists became acutely aware of the oil and gas business' privileged access to

[69] This argument was first articulated in the following co-authored paper (LLoveras et al., 2021).

[70] However, this phenomenon should not be romanticised. Indeed, in certain sections of the anti-fracking coalition, these struggles against carbon capital also provided fertile ground for the proliferation of conspiracy theories (e.g. see Szolucha, 2022).

government and how this access frequently generated policies favourable to the sector. However, this engagement also afforded important insights into how, rather than merely seeking to boost carbon capital, the UK government also took decisive action to sabotage rival business sectors. As one interviewee explained:

> The government is doing everything it can to facilitate fracking. The way the government has destroyed onshore wind energy…The way it's now, trying to destroy the solar. It's shocking really at the lack of morality. The fact that they will do anything if it appears to pander to the right sort of businesses. I've been appalled actually at what they've done (69-year-old female; Member of Local Friends of the Earth Group; Campaigner with Frack free Lancashire).

Indeed, while the UK government were endeavouring to accelerate fracking, they were simultaneously taking decisive steps to sabotage the onshore wind sector. Prior to the mid-2010s, the onshore wind sector benefitted from a favourable policy environment that facilitated swift growth. Most of these polices were enacted under the Labour governments which held power between 1997 and 2010. However, following the 2010 election, which resulted in a new Conservative-led coalition government, this favourable policy environment began to shift. This shift included the government intervening in planning processes for onshore wind, using its powers to reject more than 50 proposed sites in 2014 alone (Mourant, 2015). In April 2014, the Conservative energy minister Michael Fallon announced plans to revoke subsidies for onshore wind projects and change planning rules to make it harder for such projects to gain planning approval without unanimous local support. Presaging the detrimental impact these proposals would have on the onshore wind sector, Fallon justified this decision by arguing that the UK now had 'enough bill payer-funded onshore wind in the pipeline to meet our renewable energy commitments and there's no requirement for any more' (Mathieson, 2014: Online). Renewables UK's director of external affairs, Jennifer Webber, was far more explicit in her assessment of these plans detrimental impacts on the sector, predicting that they 'will kill the [onshore wind] industry dead' (ibid.). This prediction appears to have been rather prescient.

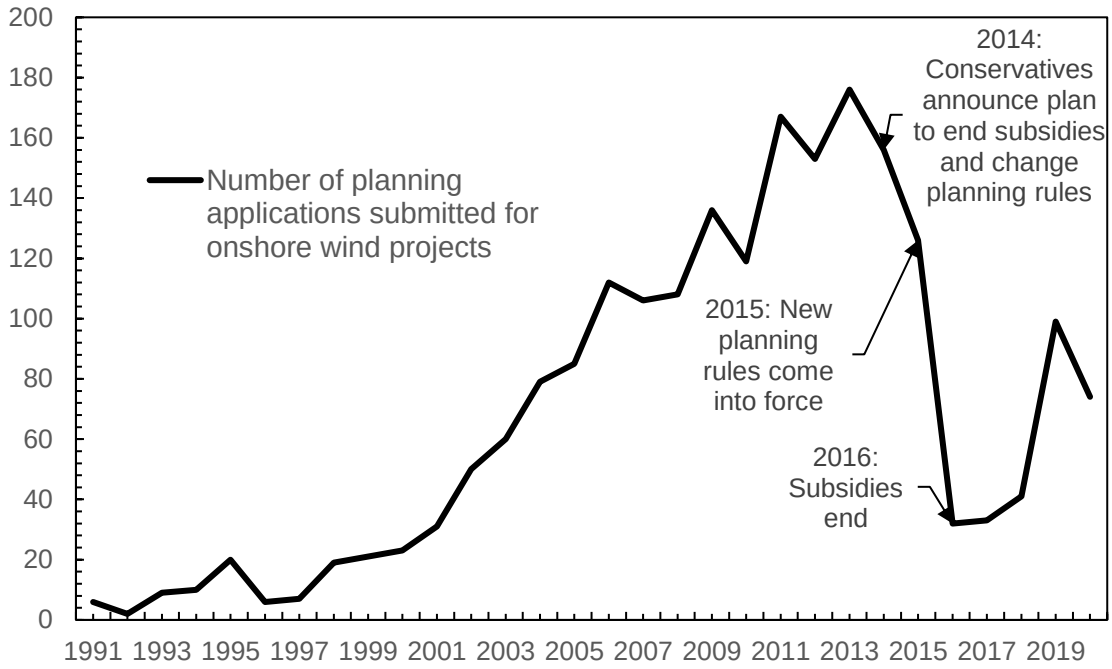


Figure 5.33 The sabotaging of onshore wind 1
DATA: Renewable Energy and Planning Database, BEIS. Available at: https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract
NOTE 1: This series plots the annual number of planning applications for onshore wind projects in the UK (1991-2020).
NOTE 2: This chart was partially inspired by Stanton (2021).

Figure 5.33 plots the number of planning applications submitted for onshore wind projects between 1991 and 2020. From a peak of 176 planning applications for onshore wind projects in 2013 (the year before the announced policy changes), each subsequent year the number of applications fell until reaching a nadir in 2016 (the year the subsidies ended) of just 32 applications. While 2017, 2018, 2019, and 2020 each recorded more onshore wind planning applications than 2016, the highest of these (99 applications in 2019) was still 44% lower than the 2013 peak.

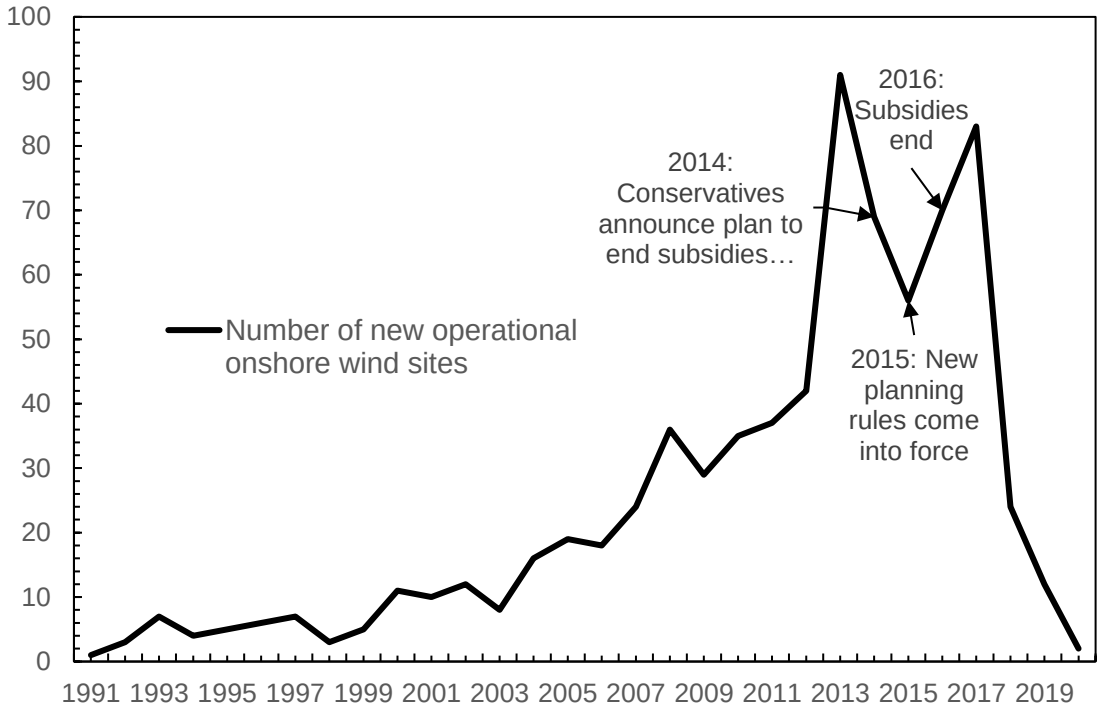


Figure 5.34 The sabotaging of onshore wind 2
DATA: Renewable Energy and Planning Database, BEIS. Available at: https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract
NOTE 1: This series plots the annual number of new operational onshore wind sites in the UK (1991-2020).
NOTE 2: This chart was partially inspired by Stanton (2021).

Figure 5.34, which charts the number of new operational onshore wind sites between 1991 and 2020, paints a similar picture. Thus, from a peak of 91 new operational onshore wind sites in 2013 (the year before these policy changes were announced), by 2019 the number of new sites had plummeted to twelve while 2020 recorded just one. Given these developments, it is difficult to disagree with the assessment of Greenpeace UK's chief scientist, Dr Doug Parr, that the UK government was responsible for the 'almost total sabotage…of the onshore wind industry' (Stanton, 2021: Online).

Viewed through the lens of CasP and carbon capitalism, the logic of this sabotage begins to cohere. As discussed previously, a central premise of CasP is that capital does not exist in general terms. Rather, the accumulatory struggle is characterised by

intra-capitalist conflict between a shifting sea of capitalist coalitions, whose alliances are forever in flux (Nitzan and Bichler, 2009). However, as Nitzan and Bichler also argue, to maintain its position, dominant capital – i.e. the preeminent government–corporate coalitions at the centre of the accumulatory struggle – must sabotage any 'lesser capitals' that might seek to supplant it (ibid.: 315). As they explain,

> (i)t is only to the extent that dominant capital can retain and augment its exclusive power against these lesser capitals, keeping them 'out of the loop', that the capitalization process can be sustained and extended…This intra-capitalist conflict accentuates the differential underpinnings of accumulation. Whereas 'profit maximizers' concentrate only on their own gains, differential accumulators are also driven to undermine their rivals' gains. Their successful sabotage gives their relative performance a double boost: it raises their own earnings while cutting those that make up the bench-mark they try to beat.

Keeping these points in mind, also consider: (a) Di Muzio's (2015) argument that, within dominant capital, those most heavily invested in oil and gas (i.e. carbon capital) are amongst the most powerful; and (b) the widespread understanding that, to combat climate breakdown, humanity's energy wants/needs must be met from 'renewable' sources, not fossil fuels. Bringing these threads together – the UK government's key role within carbon capital(ism); the accumulatory imperative to sabotage the competition; the potential threat posed by 'onshore' wind capital to 'onshore' oil and gas capital – the UK government's sabotaging of onshore wind begins to cohere.

5.3.2 Onshore wind capital vs carbon capital

The UK government's efforts to 'augment' carbon capital's 'exclusive power against…lesser [onshore wind] capitals' (Nitzan and Bichler, 2009: 315) had interesting consequences for the UK fracking conflict. Chief amongst these was the entry of Ecotricity, a UK-based privately-owned renewables energy firm (and 'lesser capital'), into the anti-fracking struggle (e.g. Ecotricity, 2018).

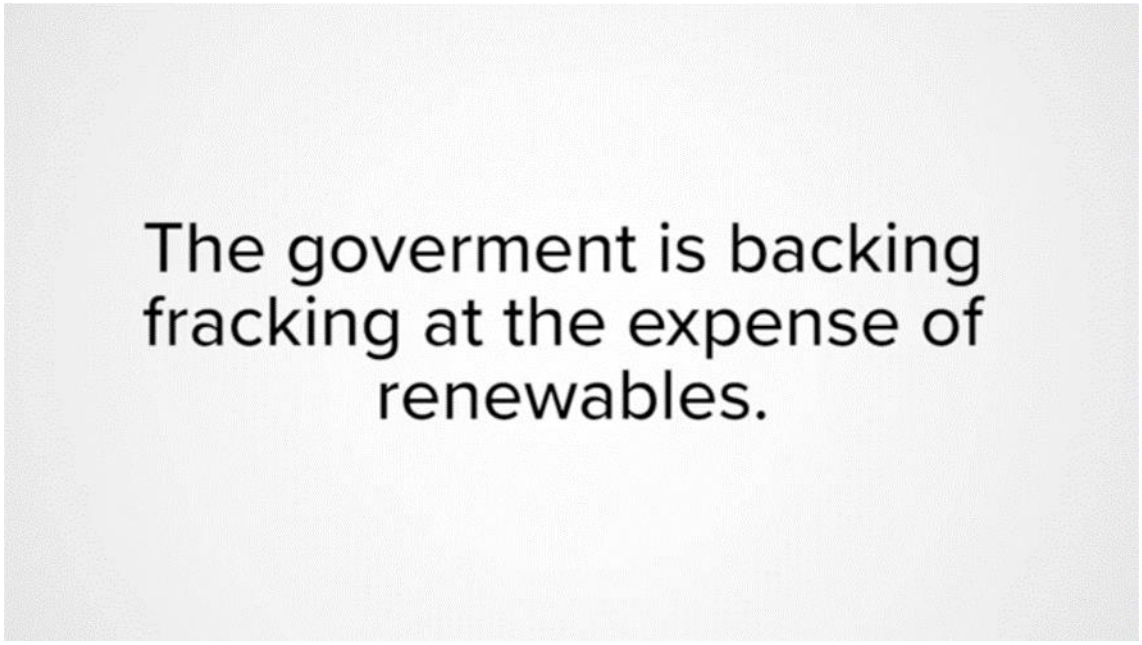


Figure 5.35 Screenshot 1 from 'Ecotricity Fights Fracking' video
Source: Ecotricity, 2018

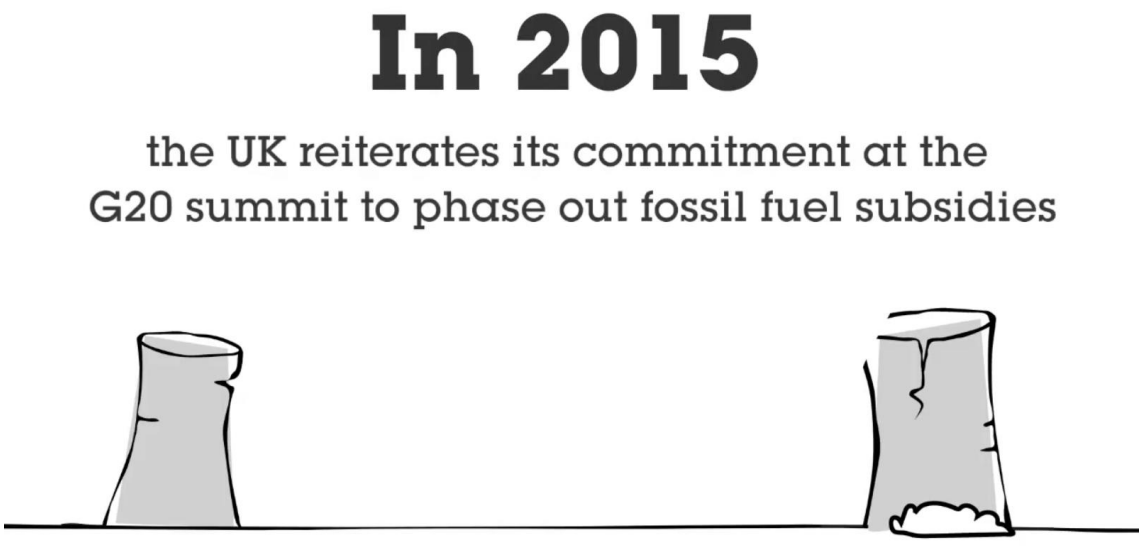


Figure 5.36 Screenshot 2 from 'Ecotricity Fights Fracking' video
Source: Ecotricity, 2018

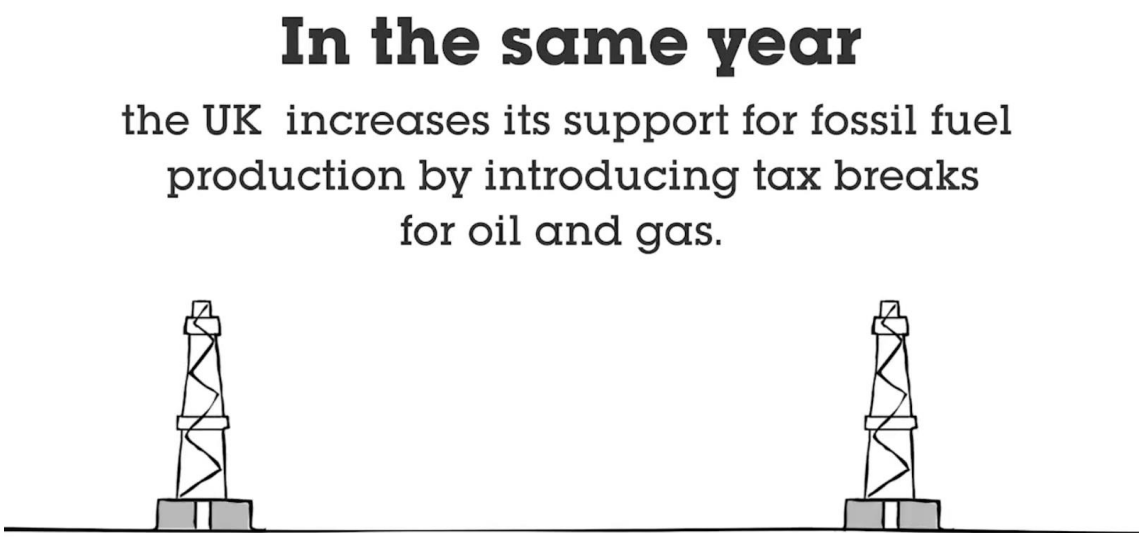


Figure 5.37 Screenshot 3 from 'Ecotricity Fights Fracking' video
Source: Ecotricity, 2018

Indeed, as illustrated by Figure 5.35, Figure 5.36, and Figure 5.37 (screenshots from one of Ecotricity's anti-fracking videos) and the following fragment from Ecotricity's CEO, Dale Vince, the UK government's unequal treatment of renewable energy relative to fracking appears to have played a key role in this decision:

> Other than support for offshore wind, there's no support from the government for renewable energy, but and that's quite a contrast to fracking where, you know, planning law has been changed to enable it, property law has been changed to enable it, and the most generous tax regime in the world has been promised to enable it (Ecotricity, 2018: Online).[71]

[71] Interestingly, onshore wind capitalists were not the only group of owners concerned by the oil and gas business' differential access to the UK government. For example, a 2013 article in the Independent reported that the French energy giant EDF, whose differential accumulation largely depends on its nuclear power generation business, were worried the UK government's support for fracking was 'hurting the French group's negotiations over building a nuclear power plant at Hinkley Point in Somerset' (Leftly, 2013: Online). Similarly, several prominent landowners in Yorkshire also publicly opposed fracking due to concerns that they, rather than the fracking companies, would be liable for any environmental damage from abandoned fracking wells (e.g. Hughes, 2018). Alongside Ecotricity, these examples would seem to support Nitzan and Bichler's (2009) argument that intra-capitalist conflict are central features of the struggle for differential accumulation.

As illustrated by the following fragment from one of my interviews, Ecotricity's anti-fracking activism involved providing funding to support anti-fracking groups. For example:

> This year, we also got a small bit [of money] from Ecotricity as well. You can't get much out of them, but they're a much easier application form [than Lush]. I would say to people just ask for like a thousand. Don't get big. We just ask for thousand, spend it wisely and show what you're doing it (Interviewee 4: Female anti-fracking activist).

Ecotricity also incorporated anti-fracking discourses into its PR and marketing campaigns. For example, in January 2018 the renewable energy firm launched its 'Boycott the Big Six Campaign' (see Figure 5.38 and Figure 5.39). Highlighting the fact that only 16% of UK residents supported fracking (at that time), this activist marketing campaign encouraged the more than 50% of households who procure their home energy from either EDF, British Gas, Scottish Power, or E.ON – four of the 'Big Six' utilities firms in the UK that 'either invest in or say they support fracking' – to boycott these companies by switching to Ecotricity (Boon, 2019: Online). The campaign further encouraged customers of the remaining two constituents of the 'Big Six', SSE and Npower, to join the boycott, arguing that these firms were also 'complicit by not coming out against fracking' (ibid.). Interestingly, rather than relying on actors as per a conventional marketing campaign, this campaign foregrounded the voices of anti-fracking activists. The following fragment from an interview with an anti-fracking activist at PNR, which featured in one of Ecotricity's Boycott the 'Big Six' campaign videos, represents just one example of such foregrounding:

> I think it's really important that people lobby the government, lobby their MPs and tell them how unhappy they are not just about fracking but about this whole imbalance in the industry and the subsidies and the tax regimes, which always favour fossil fuels and always give a disadvantage to renewable energy. So, lobbying is what people need to do, but then there's the ultimate thing of just actually changing their supplier to a renewable energy company (Ecotricity, 2018).

Figure 5.38 Screenshot 4 from Ecotricity's 'Join the fight against fracking' video
Source: Ecotricity, 2018

Figure 5.39 Screenshot 5 from Ecotricity's 'Join the fight against fracking' video
Source: Ecotricity, 2018

I frequently encountered these, and similar, arguments during my fieldwork with anti-fracking activists in Lancashire, indicating a significant degree of alignment between the anti-fracking coalition's political objectives and Ecotricity's commercial interests. As illustrated by Figure 5.40, a screenshotted headline from a 2016 article in Rupert Murdoch's *Sun* newspaper, pro-fracking actors were quick to discredit this alliance, arguing that Ecotricity and its founder's (Dale Vince) support for anti-fracking activism were purely driven by narrow pecuniary interests. Anti-fracking activists would contest such framing while also potentially highlighting the alignment between Rupert Murdoch's oil and gas interests (Horovitz, 2013) and *The Sun's* pro-fracking editorial line (e.g. Pollard, 2018). It is beyond the scope of this thesis to explore how far Ecotricity's anti-fracking activism, or *The Sun's* pro-fracking activism, were motivated by commercial as opposed to environmental, ethical, or ideological concerns.

Figure 5.40 The pro-fracking backlash against Ecotricity
Source: Culliford, 2016

However, given this thesis' objective of supporting radical political economic transformations towards sustainability and environmental justice, perhaps a more fruitful line of enquiry might be to explore: (a) some of the competing energy future visions generated by these opposing alliances/interests; and (b) some of the tensions,

barriers, and opportunities that inhere within these competing visions given the present historical juncture in carbon capitalism and petro-market civilisation.

5.3.3 Competing energy future visions

Following Di Muzio (2015), point ten of my theoretical framework argues thus: despite the increasingly grave trajectory of petro-market civilisation, which all the evidence suggests is heading for climate and ecological breakdown, oil and gas investors remain intent on 'monetiz[ing]the destruction of the biosphere through the sale and combustion of ever more carbon energy' (ibid.: 15). However, given increasing societal concern regarding this grave situation (e.g. Carrington, 2019), and the existential threat such concern poses to carbon capital's power, the latter is increasingly preoccupied with ensuring fossil fuels continue to play a fundamental role in the global energy system/social reproduction long into the future. As I shall now explore, in the UK fracking conflict, this preoccupation was exemplified by pro-fracking energy future vision discourses that sought to ensure an ongoing role for natural gas in the UK energy system and social reproduction. I will critically explore this pro-fracking discourse below before examining two anti-fracking discourses that sought to offer compelling alternative energy future visions based on renewable energy. These ongoing discursive struggles between competing energy future visions are important. For those that resonate most widely are likely to inform, and delimit, crucial near-term political economic-energy infrastructure decisions that will have far-reaching implications for the future trajectory of social reproduction and the biosphere on which it depends.

5.3.3.1 A pro-fracking energy future: Reliant on gas for many years to come

A recurrent theme within UK pro-fracking energy future discourses was the highly contentious, yet plausible, projection that the UK's social reproduction will continue to depend on natural gas for years to come. Such discourses typically begin by highlighting, albeit uncritically, the contemporary reality of the UK's social reproductive dependence on natural gas and oil. The following fragment, taken from a 2015 UKOOG infographic, provides a useful illustration of this:

> 84% of homes in the UK rely on natural gas central heating…(I)f you drive, you may be surprised at how much oil and gas is used in the rest of your car – and that includes electric cars. Car parts made from high-performance plastics have replaced heavier materials throughout the average vehicle, both inside and out, all helping to reduce weight, improve fuel economy and enhance safety…From food preservatives, flavourings, and colourings and the fuel used to transport it all over the world, it's hard to find food that hasn't been touched by oil and gas in some way (UKOOG, 2015c: Online).

Next, such discourses typically shift attention to the incontrovertible fact of the UK's increasing dependence on natural gas imports to furnish these energy-intensive patterns of social reproduction; a point invariably accompanied by concern regarding the economic/fiscal costs of this dependence. This is illustrated by the following fragment from Cuadrilla CEO, Francis Egan:

> (A)s this chart shows, the gap between consumption and domestic [natural gas] production has been growing very dramatically…The last time the UK was energy self-sufficient across all energy was around 2000. And since then we have been importing more and more energy and currently, we're spending about a billion pounds a month importing energy into the UK in the form of oil and natural gas, even the occasional coal and also electricity of course. And that's money that's spent overseas, not taxed in the UK, not generating any jobs in the UK (Egan, 2019: 19).[72]

After problematising the UK's existing dependence on *imports* of natural gas (rather than natural gas more broadly) such discourses frequently shift to more contentious ground with the argument that the UK will be reliant on natural gas for years to come:

[72] This quote was taken from an official transcript of a presentation given at the following event: *Unconventional oil and gas market in the UK – planning changes, environmental regulation and tackling the scale-up challenges 4th April 2019*. The organiser of the event, Westminster Energy and Environment Forum, provide the following disclaimer regarding this transcript: 'text based on transcription may contain errors which could alter the intended meaning of any portion of the reported content. Anyone who intends to publicly use or refer to any text based on the transcript should make clear that speakers have not had the opportunity for any corrections' (Westminster Energy and Environment Forum, 2019: 1). However, since I have checked this transcript against an audio recording of the event, I can confirm the above quote accurately reflects what was said.

> And any credible forecast shows that there will be an ongoing role for natural gas in UK energy supply….So natural gas is here and it's here for quite a while to come in the UK and really the question is where do you get it from (ibid.).[73]

Having asserted the inevitability of the UK's future gas dependence, such discourses typically provide the following answer to Egan's rhetorical question. This is illustrated by the following fragment from UKOOG Director, Corin Taylor:

> But there is some good news…If you look at the potential of shale gas production in the UK, we can look to some useful lessons from the US in terms of how shale gas well productivity has improved dramatically over recent years...(T)he resource is there, the early findings are good, and if we can as an industry develop this up, I think there are some quite major benefits for the country (Taylor, 2019: 52).[74]

Alongside the standard arguments regarding the potential 'economic' benefits of fracking, such discourses also sought to frame UK shale gas as a less climate damaging option than imported gas. However, while questionable on its own terms (e.g. Turk et al., 2017), this latter argument also rests on the contested assumption that UK shale gas would replace, rather than expand, the total quantity of gas extracted, marketed, and burned globally (Anderson and Broderick, 2017). However, perhaps the most consequential and contentious aspect of these discourses concern their attempt to frame future UK gas demand as an inevitable given that is entirely compatible with the imperatives of climate change mitigation. However, to support these arguments pro-fracking actors did not have to invent their own creative climate change and gas demand scenarios. Rather, as illustrated by the following fragment from a UKOOG submission to the International Trade Committee, they were able draw upon existing forecasts published by authoritative sources such as the UK Climate Change Committee (CCC):

[73] See previous footnote.

[74] See footnote 72.

> The CCC forecast that the UK would require 600 TWh of natural gas in 2050. This requirement equates to a 32% reduction in UK gas demand from today. Based on forecasts by the Oil and Gas Authority for the UK Continental Shelf (UKCS) natural gas production (i.e. offshore), the UK would therefore be reliant upon imported gas to meet 86% of demand by 2050. Such a level of imports represents a significant increase from today, where 50% of our natural gas is imported (UKOOG, 2019: Online).

Here, it is worth highlighting an important, albeit relatively marginalised, critique regarding the highly optimistic assumptions underpinning conventional climate change mitigation 'net-zero' models and scenarios, including the UK CCC one that informed the 2050 gas demand projection cited by UKOOG. Following the established norm in such models (Hickel et al., 2021), the CCC scenario that generated the UK gas demand forecast cited by UKOOG assumes continued economic growth beyond 2050; an assumption that renders decarbonisation even more challenging than it otherwise would be in the absence of growth (Anderson et al., 2020). To reconcile continued economic growth with 'net-zero' by 2050 targets, these types of scenarios 'gamble on dramatic technological change, particularly negative emissions technologies and productivity improvements big enough to drive absolute decoupling of gross domestic product (GDP) from energy use' (Hickel et al., 2020: 766). However, these assumptions are extremely risky. For it is far from certain whether the absolute decoupling of energy consumption from GDP growth – hitherto unrealised – or negative emissions technologies – untested at scale – constitute feasible strategies to combat climate and ecological breakdown (Hickel and Kallis, 2020; Anderson et al., 2020; Larkin et al., 2021).[75] Indeed, as argued by Anderson et al. (2020: 1290), without these assumptions, from 2020 onwards, developed nations such as the UK would need to achieve double-digit emissions reduction rates in order 'to align their policies with the Paris Agreement's temperature commitments and principles of equity'. For the UK and other wealthy nations, rather than 2050, this would require total energy

[75] This paragraph draws on arguments I previously developed in the following co-authored Wales Case Study report for the EU Horizon 2020 Project: ENergy TRANsitions from Coal and carbon: Effects on Societies (ENTRANCES) (Barrett et al., 2022).

decarbonisation to be achieved between 2035 and 2040. Thus, rather than the 600 TWh of natural gas the CCC and UKOOG argue the UK will require in 2050, these more exacting decarbonisation timeframes dictate that 'fossil fuels (including natural gas) have no substantial role in an EU [or UK] energy system beyond 2035' (Anderson and Broderick, 2017: 5). Achieving the above would necessitate social, cultural, and political economic transformation at a pace and scale unprecedented in history (Hickel and Kallis, 2020; Stoddard et al., 2021; Anderson et al., 2020). In other words, a purposeful transformation beyond carbon capitalism and petro-market civilisation. However, while the pro-fracking discourse(s) outlined above sought to achieve the very opposite, they were arguably aided in this endeavour by the assumptions of mainstream climate and energy scenario modelling, and the 'narrow techno-economic mindsets and ideologies of control' that underpin them (Stoddard et al., 2021: 654).

5.3.3.2 Anti-fracking renewable energy future visions

To combat these pro-fracking energy future discourses, anti-fracking activists mobilised their own alternative energy future discourses. Invariably, renewable energy alternatives to fracking such as onshore wind and solar featured prominently in these discourses. However, given the diverse politics of the anti-fracking coalition, which included small c conservative organisations such as the Campaign to Protect Rural England (CPRE), radical anarchist groups, and much in between, these anti-fracking energy future discourses took many different forms. However, given space constraints, here I will focus on two broad types of anti-fracking energy vision*: renewables to the rescue* and *system change not climate change.* Here, it is important to be mindful that these discourses are not mutually exclusive. Indeed, while I explore them separately here for analytical purposes, this schematic approach belies a more complex reality characterised by the mixing and matching of discourses and framings.[76]

The first type of anti-fracking energy future vision I will explore might be termed *renewable energy to the rescue*. While advocating a greater role for the public in the

[76] I should add that this qualification arguably applies equally to my treatment of pro-fracking discourses.

ownership and management of renewable energy infrastructure, this type of energy vision tends to elide broader questions of political economic power and the relationship between global capitalism and social ecological crises. The following fragment from the CPRE provides a useful illustration of this discourse:

> In 2045, England is powered entirely by clean, reliable, environmentally-sensitive renewable energy….In a nation free from fossil fuels, renewable energy installations are plentiful, efficient, and operating in harmony with their natural surroundings. Better still, many of these renewables are owned, at least in part, by local people who are enjoying the economic benefits and opportunities they provide…Local people in villages and towns across the countryside have been proactively and positively engaged in shaping their energy futures, through the planning system and other means (CPRE, 2020: 44).

Renewable energy to the rescue discourses also have relatively little to say about the potential implications of a post fossil fuel era for the high energy-intensive patterns of social reproduction that pervade wealthy nations such as the UK and are increasingly being pursued or adopted elsewhere. In this respect, this type of discourse is broadly aligned with the dominant techno-centric approaches to climate change mitigation discussed above that assume global capitalism can be greened while contemporary patterns of social reproduction remain broadly unchanged.

The other type of anti-fracking energy future vision I want to explore – s*ystem change, not climate change* – also emphasises the importance of renewable energy. However, beyond questions of energy technologies, discourses associated with this type of vision frequently focus on broad themes of political economic power, capitalist property relations, and the latter's role as driver of social ecological crises. As such, alongside the rapid deployment of renewable energy technologies, this type of discourse also advocates for more profound socio-ecological transformations. While there is considerable variation within this category (e.g. Berglund and Bailey, 2023), here I will focus on a *system change, not climate change* vision associated with anti-fracking trade union activists. The following fragment from a Public and Commercial Services Union (PCS) pamphlet on their proposals for 'just transition and energy democracy' provide a useful illustration of this type of discourse:

> To have any hope of achieving the Paris targets requires a rapid large scale decarbonisation and a transition to 100% renewable energy…But switching from fossil fuels to renewables is not enough. We need to address climate change as a toxic by-product of capitalism, unfettered growth and greenhouse gas emissions, and the concentration of ownership of public goods in private hands with 'light touch' government…We also need to tackle it as a political process that confronts the inherent inequality and imbalance of power in our political and economic systems. And a good place to start is by confronting power in the power sector itself (PCS, 2017: 2).

In line with these objectives, PCS makes several demands of the UK government. These demands include bringing all energy and utilities back into public ownership, large-scale publicly financed investments in renewable energy infrastructure, and worker/ citizen participation to ensure opportunities for (re)training and the creation of a more democratic energy system based on secure, unionised public sector employment. Given PCS' status as the leading trade union representing civil servants, its proposals to expand public sector employment while securing social protections is hardly surprising. These proposals, and the union's broader vision of 'energy democracy', which include more radical measures such as 'socialising ownership and democratising productive processes and energy generation' (ibid.: 4), are aligned with the global Trade Unions for Energy Democracy (TUED) initiative (PCS. 2017; Sweeney and Treat, 2018). In terms of political economic philosophy, this initiative and PCS' proposals for 'energy democracy' can broadly be situated in the eco-socialist/Marxist tradition. This tradition seeks a dialectical synthesis of insights from Marxian political economy and the ecological movement (Lowy, 2007). While there are multiple iterations of this synthesis (e.g. Gorz, 1975; Burkett, 2006; Foster et al., 2010), each of these are arguably united by 'a critique of "market ecology", which does not challenge the capitalist system, and of "productivist socialism", which ignores the issue of natural limits' (Lowy, 2007: 294). I am broadly sympathetic to both these critiques and to PCS' energy vision. However, following Dow (2019: 30), I would also caution that eco-socialism frequently elides: (a) the relationship between fossil fuels, capitalisation, and social reproduction; and (b) the far-reaching implications of a post-fossil fuel era for the high energy-intensive patterns social reproduction that prevail in the Global North. Indeed, PCS' vision says little about the forms of social reproduction that might be possible in an 'energy

democracy' powered by renewables. Following Dow (2019: 30), these blind spots are arguably rooted in the eco-socialist theorisation of (carbon) capitalism as a mere mode of production rather than (an integral aspect of) 'a civilisational order' that Di Muzio (2015), drawing on Gill (1995), has termed petro-market civilization.

In focusing on these two anti-fracking energy future visions, I do not wish to give readers the false impression that anti-fracking activists were uninterested in the myriad interrelations between political economic power, fossil fuels, and social reproduction. During my fieldwork, I regularly encountered, and participated in, debates and discussions concerning these interrelations. For example, anti-fracking activists' engagement with fracking, especially their encounters with prospective fracker and petrochemicals giant Ineos, led many to explore the integral role of fossil fuels in the manufacture of plastics and petrochemicals. This and similar engagements prompted further reflections on: (a) how contemporary energy-intensive patterns of social reproduction are deeply reliant on oil and gas products; and (b) the urgent need for radical cultural, socio-technical, and political economic transformations to ensure a good life for all that does not depend on such products. However, given the ongoing need to unite a highly heterogenous anti-fracking coalition while continuing to shift public opinion against fracking (and fossil fuels), it is understandable, from a strategic perspective, why many prominent anti-fracking future energy vision discourses tended not to foreground these daunting social reproductive challenges while falling somewhere between the *renewable energy to the rescue* and *system change, not climate change* visions outlined above.[77] At the same time, however, there are also potential dangers associated with these discursive elisions regarding the social reproductive transformations that will likely accompany any civilisational shift away from fossil fuels. Firstly, not confronting these social reproductive challenges directly risks leaving a vacuum for pro-fossil fuel discourses that positively celebrate carbon capital's role in social reproduction.

[77] In making this argument, I partially draw on ideas developed in the following co-authored paper (Lloveras et al., 2021).

Figure 5.41 UKOOG highlighting the dependence of contemporary patterns of social reproduction on oil and gas
Source: UKOOG, 2018

The following fragment from Ineos' website provides a useful illustration of such discourse (see also Figure 5.41, above):

> You may not have heard of Jim Ratcliffe, but he's is in your life from the moment you wake up until you go to sleep. He is responsible for the plastic cap on your toothpaste tube, to the chlorine that cleans the water you use to brush your teeth. Many of the things you use during the day that are made using chemicals "we've had a hand in," he says with a smile. This includes our clothes, our cars, our furniture, and the packages our food and medicines come in. Describing Jim as "Britain's most successful postwar industrialist", John Arlidge asks him about his views on manufacturing, investments, shale gas and his latest project to build an uncompromising 4x4 (Ineos, 2017: Online).

For if these discourses resonate with enough people, there is a distinct possibility that the post-fossil fuel era will be further delayed while carbon capital's power becomes even more entrenched. Another potential risk of ignoring the social reproductive implications of a post-fossil fuel era is to pave the way for the replacement of carbon

capitalism with lithium capitalism, which, if present trends continue, would arguably be just as riven with social ecological injustices and EDCs (e.g. Jerez et al., 2021; Dunlap et al. 2023).

5.4 Conclusion

Having presented my analysis and findings, the concluding chapter will critically discuss these findings in relation to the academic literature and my research aim and questions. I will then reflect on the thesis' principles theoretical and methodological contributions before offering some recommendations for future research.

Chapter 6: Discussion and Conclusions

In the contexts of EDC (broadly) and fracking conflict (specifically), this study aimed to explore, understand, and explain the roles/dynamics of capitalist power and vulnerability. Pursuant to this aim, which aligns with broader efforts to build a more just, sustainable, and equitable political economic order, this study sought to address the following three research questions:

1. In what ways does capitalist power both drive and shape EDCs/fracking conflict and why is this so?
2. In what ways are capitalists vulnerable within the context of EDCs/fracking conflict and why is this so?
3. What are the implications of capitalist power and vulnerability for:
   (i) environmental justice activism?
   (ii) ongoing efforts to build a more just, sustainable, and equitable political economic order?

This concluding chapter will begin by summarising the principal arguments presented thus far (Section 6.1). This will be followed by a critical discussion of my research findings regarding capitalist power and vulnerability in the context of fracking conflict and EDC. Structured around my three research questions, this discussion will explore some key implications of my findings for theory and practice (Section 6.2). I subsequently discuss the thesis' main methodological contributions (Section 6.3) before offering some recommendations for future research (Section 6.4).

6.1 Summary of main arguments

Chapter 1 commenced by highlighting the accelerating social ecological crises and the concomitant proliferation of environmental conflicts in general and fracking conflict in particular. Having advocated for critical politically engaged research to support efforts to build a more just, equal, and sustainable political economic order, I then introduced the thesis' overall aim, and the research questions it would seek to address (see above).

Chapter 2 critically reviewed the EDC literature; the principal literature to which this thesis contributes. Broadly situated at the intersection of the cognate fields of EE and PE, this literature offers numerous insights into the political economic drivers and dynamics of EDC. However, my review also identified important weaknesses in this literature; especially regarding extant theorisations of the capital-power dialectic in the context of EDCs. In this chapter, I also identified similar weaknesses in the fracking conflict literature.

Chapter 3 introduced Nitzan and Bichler's (2009) CasP approach and Di Muzio's (2015) theory of carbon capitalism, arguing that these cognate approaches could help EDC and fracking conflict scholars to address some of the weaknesses identified in Chapter 2. Drawing on Cochrane and Monaghan's (2012) activist-oriented reading of CasP, this chapter also argued that environmental justice activists could also benefit from engagement with these overlapping approaches. The chapter concluded by synthesising a CasP-carbon capitalism driven theoretical framework for elucidating capitalist power and vulnerability in the context of EDCs and fracking conflict.

Chapter 4 articulated the methodology, ethico-political concerns, and novel research strategy underpinning this research. This strategy productively synthesised two epistemological approaches that sit somewhat in tension with one another: (a) CasP's 'top-down' approach, whereby the researcher analyses the quantities of capital/differential accumulation from the vantagepoint of capitalists themselves, before endeavouring to elucidate the qualitative power struggles that those quantities express; and (b) standpoint theory's 'bottom-up' approach, which begins investigations from the lives of marginalised social groups, before studying up and out to investigate the power relations/institutions that impinge on the lives of such groups.

Chapter 5 comprised a theoretical-empirical investigation of the UK fracking conflict (2011-2020). Drawing on my CasP and carbon capitalism inspired theoretical framework, this investigation was undertaken with a view to answering my three research questions and achieving the overall research aim (see above). Section 5.1 explored some key quantities that, I argued, constituted important expressions of the

myriad (qualitative) power struggles that comprised this decade-long conflict. These quantities were: UK public opinion on fracking (2013-2020); and the decade-long differential decumulation of AJ Lucas and IGas (2010-2020); two key investors in UK fracking. I further argued that these quantitative foci could respectively be understood as expressions of two key, albeit highly interrelated, areas of strategic struggle in this conflict. Thus, while the former expressed the struggle to shift public opinion on UK fracking, the latter expressed the struggle to influence investors' perceptions regarding its financial viability. I also attributed a significant role for the UK anti-fracking coalition in influencing the highly correlated trends of falling public support for fracking and the differential decumulation of AJ Lucas and IGas. Moreover, having identified very loose relationships between AJ Lucas and IGas' differential earnings and differential capitalisations, I further suggested that the elementary particles of differential risk and differential hype (as opposed to differential earnings) were most implicated in this story of anti-fracking coalition success.

Section 5.2 sought to elucidate the qualitative power struggles that were partially expressed in the quantities examined in Section 5.1. This was operationalised via an exploration of the two strategic (qualitative) power struggles identified in Section 5.1. Although deeply interrelated, for practical purposes I largely analysed these two broad strategic struggles separately, albeit highlighting important connections where appropriate. First, I explored the struggle for public opinion examining how the UK pro-fracking coalition deployed fracking hype discourses with the goal of increasing public support for their plans (Section 5.2.1.1). I then explored the myriad tactics and discourses deployed by the UK anti-fracking coalition to deflate pro-fracking hype, arguing that such discourses successfully drew upon innumerable events, research findings, and public interventions by (more trusted) actors, thus increasing their resonance (Section 5.2.1.2). In Section 5.2.1.3, I argued that fracking hype contestation illustrated the deep interconnections between the two strategic struggles. Thus, the pro-fracking coalition's *fracking hype offensive* targeting the UK public formed an essential part of a broader pro-fracking strategy of differential risk reduction regarding UK fracking investment. Whereas the anti-fracking coalition's *fracking hype deflation*

drive targeting the same audience represented a key part of a wider anti-fracking strategy of driving up the risks of UK fracking investment.

Section 5.2.2 investigated *the struggle to influence investors' perceptions regarding the financial viability of UK fracking*. This investigation began with an exploration of *the pro-fracking coalition's fracking hype offensive to influence investors' perceptions*. This offensive was necessary, I argued, because the geological-financial challenges of fracking rendered it extremely capital intensive. Consequently, the fracking business was engaged in a constant struggle to attract and retain investors and pro-fracking hype was central to the success of this endeavour. Having identified this aspect of fracking business vulnerability and critically examined some examples of pro-fracking hype targeting investors, I then explored how the UK anti-fracking coalition deployed various discourses that sought to punctuate pro-fracking hype.

Section 5.2.3 explored UK fracking conflict's power struggles through the lens of Bichler and Nitzan's (2017) capitalist hierarchy formation-resistance-energy demand dialectic. Having done this, I argued that the latter provides a useful tool for elucidating EDC dynamics.

Reflecting on the UK fracking conflict's broader significance, Section 5.3 explored the UK fracking conflict through the analytical theme of power struggles over the future of carbon capitalism and petro-market civilisation. This section began by exploring how anti-fracking activists' struggles enabled them to gain a deeper understanding of capitalist power, carbon capitalism, and the central role of oil and gas in contemporary patterns of social reproduction. I then examined how the UK fracking conflict illuminated the intra-capitalist conflict that defines the accumulatory struggle, while reflecting on the implications of this for the coalitional politics of environmental justice activism. Finally, I critically explored (and reflected on the implications of) some of the competing energy future visions that emerged during the UK fracking conflict.

6.2 Capitalist power and vulnerability in the context of fracking conflict and EDC: theoretical and practical implications

In this section, I will critically discuss this thesis' main findings in relation to my three research questions while also reflecting on the theoretical and practical implications of these findings. However, before doing so it is important to acknowledge that this research was undertaken in a particular place and time. Thus, while the universalising tendencies of carbon capitalism and the capitalist mode of power suggests many of my findings from the UK fracking conflict will be relevant beyond the immediate case study (Di Muzio, 2015; Nitzan and Bichler, 2020), others may be less readily transferable to other spatio-temporal contexts. This point is underscored by the fact that while the UK government spent nine years aggressively promoting fracking (2011-2019), other European governments were far less enthusiastic. For example, the French government banned fracking in 2011, while similar bans were also instituted in Denmark (2012), Bulgaria (2012), the Netherlands (2015), Germany (2017), and the Republic of Ireland (2017) (Peigné, 2022; O'Halloran, 2019). Consequently, when attempting to answer research questions such as, for example, how capitalist power both drives and shapes EDC/fracking conflict, and why this is so (research question 1), it is important to be mindful that 'capitalism can organise somewhat differently in different contexts' (Bichler and Nitzan, 2020b: 16). Indeed, as Bichler and Nitzan have argued, the dialectical relationship between capitalised power and resistance – wherein such 'power is always imposed against and indeed creates its own opposition' (ibid.: 16) – suggests that capitalism 'must, almost by definition, develop with some permutations across different societies' (ibid.: 16). Having highlighted this important point, I will now address the first research question.

6.2.1 In what ways does capitalist power both drive and shape EDC/fracking conflict and why is this so?

6.2.1.1 The capitalist struggle for augmented differential power

My analysis of the UK fracking conflict suggests capitalists' pursuit of *differential* accumulation, conceptualised as a quest for increased *differential* power (Nitzan and Bichler, 2009), constitutes a fundamental driver of EDC and fracking conflict. Viewed

through the lens of CasP, capitalists deploy their power to (re)shape social reproduction – and the social metabolism (Scheidel, 2023) – as a means of increasing that power (Nitzan and Bichler, 2009; Di Muzio, 2015). In other words, 'power is both the means and end of [differential] accumulation' (Nitzan and Bichler, 2002: 9). Although capitalists deploy various financial metrics to gauge their success in this endeavour, *differential capitalisation* is arguably the most important (Cochrane, 2015). The latter comprises a static measure of a corporation/corporate coalition's capitalisation relative to a chosen financial benchmark (e.g. the S&P 500). Described by Nitzan and Bichler (2009: 18) as 'the algorithm of the capitalist creorder', capitalisation 'is the mechanism through which capitalist power is commodified, structured and restructured'. Capitalisation expresses investors' collective judgement of a capitalised asset's ability to generate future (differential) earnings discounted for risk. When capitalists are confident that their future earnings expectations will be realised, they apply a low discount rate, resulting in higher valuation for the capitalised asset in question. When capitalists are less certain in their forecasts, the opposite applies (Nitzan and Bichler, 2009).

Differential accumulation/decumulation is conceptualised as increasing/falling differential capitalisation through time (Nitzan and Bichler, 2009). However, as illustrated by the UK fracking conflict, differential accumulation is never guaranteed and differential decumulation is eminently possible. Consequently, capitalists must work hard just to maintain their relative power. To increase it, they must work harder still. This quest for augmented differential power can involve myriad strategies and tactics. However, for these strategies and tactics to be successful, the corporation/corporate coalition in question must exert its power in ways that have at least one of the following impacts on the elementary particles of differential capitalisation:

1. increase its differential earnings
2. increase its differential hype
3. decrease its differential risk (Nitzan and Bichler, 2009; McMahon, 2022).

My findings from the UK fracking conflict suggest that, of these three elementary particles of differential capitalisation, *differential hype* and *differential risk* were the most strategically important for the UK pro-fracking coalition. Consequently, most pro-fracking coalition power plays within this conflict, manifested through myriad interventions/tactics, can arguably be understood as strategic efforts to increase the differential hype and/or decrease the differential risk of UK fracking investment. Examples of the former include the extensive deployment of pro-fracking hype discourses framing UK shale gas as a huge economic opportunity for the UK, local communities, and global investors. Examples of the latter include generous tax breaks for fracking companies; changes to property law enabling fracking companies to drill/frack under other people's land without needing to obtain the landowner's permission; planning reforms to fast-track shale gas planning applications; the criminalisation of anti-fracking activists; and the use of draconian civil injunctions to prevent disruptive anti-fracking protests.

Importantly, however, my argument that the capitalist imperative of power augmentation through differential accumulation constitutes a fundamental driver of EDC/fracking conflict does not negate existing insights from the EDC literature. For example, this argument does not contest findings from previous studies that identify cost-shifting, the search for 'Cheap Nature', and socio-metabolic growth/changes as key drivers of EDC (e.g. Scheidel et al., 2018; Demaria, 2017). More constructively, perhaps, my analysis demonstrates the possibility, and explanatory value, of enfolding these prior insights within a broader CasP-carbon capitalism inspired theoretical framework. Therefore, within such a framework, (dominant) capital's pursuit of differential power (e.g. Nitzan and Bichler, 2009; Di Muzio, 2015) would constitute *a* fundamental driver of cost-shifting and the other EDC/fracking conflict-precipitating phenomena previously identified in the EDC literature (e.g. Scheidel et al., 2018; Demaria, 2017).

6.2.1.2 The external breadth-internal breadth-EDC nexus

My analysis also illuminates important dynamics associated with the capitalist quest for power augmentation that seem especially implicated in the generation of

EDC/fracking conflict. Unsurprisingly perhaps, my analysis indicates that, of Nitzan and Bichler's (2009) regimes of differential accumulation (see Table 3.1, reproduced again below), green-field expansion (i.e. external breadth) is the one most directly implicated in EDC/fracking conflict. This finding broadly aligns with existing EDC scholarship that identifies expanding commodity frontiers as an important source of EDCs (e.g. Schindler and Kanai, 2018; Schindler and Demaria, 2020).

Table 3.1 Nitzan and Bichler's 'Regimes of differential accumulation'

	External	Internal
Breadth	Green-field	Mergers & Acquisitions
Depth	Stagflation	Cost cutting

Source: Nitzan and Bichler, 2009: 329

However, my related finding that several key UK fracking investors financed high risk green-field fracking growth with the goal of attracting larger, more dominant, oil and gas corporations to purchase their UK shale asset(s) is especially illuminating. This finding suggests dominant capital's tendency to pursue differential accumulation through mergers and acquisitions/internal breadth (Nitzan and Bichler, 2009) constitutes a potent, albeit indirect, driver of EDC/fracking conflict. For it appears that this tendency constitutes a strong gravitational force, incentivising private equity capital (e.g. Riverstone Holdings, Kerogen etc.) and more peripheral corporate entities (e.g. AJ Lucas, IGas, etc.) to engage in higher risk green-field growth/external breadth on dominant capital's behalf. This arguably explains why oil and gas majors such as Shell and BP expressed their support for UK shale gas exploration, even though they had no investments in UK fracking (e.g. Bawden, 2013b; Macalister, 2014). From the perspective of EDC research and scholarship, this insight enriches extant

understandings of the driving role of capital in commodity frontier expansion and EDCs (Schindler and Kanai, 2018). It also enriches the CasP literature by illuminating how dominant capital's propensity to seek differential accumulation via mergers and acquisitions (e.g. Nitzan and Bichler, 2009) incentivises private equity capital and more peripheral corporate entities to pursue their own accumulatory objectives via higher risk green-field growth.

6.2.1.3 The UK state of carbon capital

The important role of smaller, relatively peripheral, firms in the UK pro-fracking coalition (e.g. AJ Lucas, IGas etc.), which also contained the UK government and other larger corporations (e.g. Ineos, Centrica, Total, GDF Suez etc.) somewhat complicates Nitzan and Bichler's (2009) understanding of dominant capital. Nitzan and Bichler (2009: 315) define dominant capital as 'a cluster' they 'equate with the leading corporate–government coalitions at the core of the [accumulatory] process'. Within the CasP framework, dominant capital is counterposed against 'a periphery of capital, comprising the many firms outside the core', which Nitzan and Bichler argue 'constitutes a permanent threat to [dominant capital's] accumulation' (ibid.). However, viewed through the lens of Di Muzio's (2015) carbon capitalism, the co-presence of large and relatively peripheral corporations in the UK pro-fracking coalition (alongside the UK government) coheres with the latter's analysis that the oil and gas business (i.e. carbon capital) represents one of the most powerful sectors of dominant capital. Thus, while the UK pro-fracking coalition contained both large and small oil and gas corporations/investors, this coalition was arguably united by a shared interest in: (a) the differential power of the oil and gas business as a whole; (b) the perpetuation of a status quo in which global patterns of social reproduction continue to depend on oil and gas extraction; (c) accumulating differentially through UK fracking.

To illuminate the powerful social forces that gave rise to the UK pro-fracking coalition, I combined Nitzan and Bichler's (2009) state of capital concept with Di Muzio's (2015) theory of carbon capitalism. In doing so, I argued that the UK pro-fracking coalition emerged out of *the UK state of carbon capital.* Namely, those 'corporation[s] and the network of institutions and organs that make up [the UK] government' (Nitzan and

Bichler, 2009: 8) whose power is intimately tied to the continued extraction and monetisation of oil and gas. Viewed through this lens, my findings suggest that, for capitalist coalitions seeking to accumulate differentially via controversial forms of extractive green-field expansion (e.g. fracking, mining etc.), capitalising government power is a prerequisite for success in this endeavour. As illustrated by the 2019 moratorium on shale gas fracking and the subsequent differential decumulation and financial losses of key fracking companies, policy makers have considerable power to both enable and frustrate differential accumulation. These moratorium-induced declines in differential capitalisation underscore the extent to which private corporations capitalise government power to shape social reproduction and the overall legal-institutional-investment environment in which they operate.

This CasP-carbon capitalism inspired analysis moves beyond dominant explanations of EDC/fracking conflict that conceptualise the ubiquitous role of governments in such conflicts in terms of primitive accumulation, accumulation by dispossession, or extra-economic accumulation (e.g. Demaria, 2017; Scheidel et al., 2018; Vandevoorde, 2022). Following Nitzan and Bichler (2009), my theoretical-empirical analysis of capitalist power in the UK fracking conflict underscores the fundamental role of government power in constituting capitalist power. As such, this analysis problematises Marx-inspired EDC explanations that confine government-driven accumulation and EDCs to a supposedly 'extra-economic' realm. Indeed, my analysis supports Nitzan and Bichler's (2009) argument that there is no 'economic' or 'extra-economic' accumulation, only (differential) accumulation. Thus, although governments and corporations are separate entities, their myriad interrelations are so profound that 'the capitalist government…is [arguably] embedded not only in the so-called "primitive" forms of accumulation, but potentially in every single bit of it' (Nitzan and Bichler, 2009: 296). Moreover, by exploring capitalist power in EDCs beyond notions of appropriation and cost-shifting (e.g. Demaria, 2017; Schindler and Demaria, 2020), this thesis arguably helps elucidate important power relations/dynamics that eludes these two useful concepts.

6.2.1.4 Intra-capitalist conflict

My theoretical-empirical analysis of the UK fracking conflict also supports Nitzan and Bichler's (2009) argument that capital is not a unified actor. Indeed, my exploration of the UK pro-fracking coalition's efforts to augment its relative power elucidates how the struggle for increased differential power is riven with intra-capitalist conflict between competing capitalist coalitions. This insight has the potential to facilitate richer, more nuanced analyses of EDCs/fracking conflicts. Thus, rather than the relatively clear-cut contests between capital in general and environmental justice activists that the EDC literature tends to portray (e.g. Scheidel et al., 2018; Schindler and Kanai, 2018), the differential nature of the accumulatory struggle means such EDCs can also involve significant amounts of intra-capitalist conflict. The UK government's sabotaging of onshore wind while simultaneously endeavouring to boost fracking/carbon capital is a case in point. This latter finding arguably accords with Nitzan and Bichler's (2009: 315) argument that dominant capital must constantly endeavour to preserve and increase 'its exclusive power against…lesser capitals, keeping them "out of the loop"' (ibid.). However, more concretely, viewed through the lens of Di Muzio's (2015) theory of carbon capitalism, this example arguably reflects the exclusive power of carbon capital.

6.2.1.5 The power imposition-resistance spiral

Considering how capitalist power impacts the dynamics of EDC/fracking conflict, my analysis of the UK fracking conflict also illustrates the relevance of Bichler and Nitzan's (2017) arguments regarding the dynamic relationship between capitalist hierarchy formation, energy use, and conflict. Building on Fix (2017), Bichler and Nitzan (2017) argue that, since capitalists are driven by the imperative to augment their relative power, this generates relentless competition to construct ever-larger hierarchical organisations. Alongside the expansion of business hierarchies, this process also necessitates hierarchy growth in non-business institutions and organisations (e.g. the Treasury, BEIS, DEFRA, the police, the legal system) whose power is also capitalised by private business (e.g. Ineos, AJ Lucas, IGas, Centrica etc.). Furthermore, since hierarchical power invariably sparks resistance from those on whom it is imposed (e.g. anti-fracking activists), capitalists must construct even greater hierarchies and inflict

ever more sabotage to combat such resistance (e.g. the UK government overruling Lancashire County Council's PNR decision; police and private security surveillance of anti-fracking activists; fracking firms' use of draconian civil injunctions to subdue anti-fracking protests). However, how these power imposition-resistance dynamics unfold will vary depending on socio-spatial context. Thus, while UK anti-fracking activists experienced multiple forms of state-corporate violence and surveillance, these power impositions were considerably less severe than those faced by environmental justice activists in other parts of the world (e.g. Jeffords and Thompson, 2016; Scheidel et al., 2020; Temper et al., 2020). For example, Global Witness reports that 200 'land defenders' were murdered in 2021 during the course of their struggles - mostly in the Global South (Global Witness, 2022). The growing trend of death threats and assassinations targeting environmental justice campaigns is most prevalent in EDCs involving indigenous activists (e.g. Scheidel et al., 2020). Indigenous communities are also more likely to be subjected to violent/forced displacement and land grabs to make way for extractive projects (e.g. Temper, 2019a; Scheidel et al., 2023). These examples underscore how the human risks and costs of resisting capitalist (differential) power in EDCs are also experienced differentially, both within and across different socio-spatial contexts.

6.2.2 In what ways are capitalists vulnerable within the context of EDCs/fracking conflict and why is this so?

6.2.2.1 Forward-looking accumulation and capitalist vulnerability

Since differential accumulation is dependent on investors' earnings expectations concerning a fundamentally uncertain future, this uncertainly is a key source of capitalist vulnerability (e.g. Nitzan and Bichler, 2009; Cochrane and Monaghan, 2012). My analysis of the UK fracking conflict suggests this area of capitalist vulnerability becomes especially pronounced in the contexts of EDC and fracking conflict. As stated previously, to accumulate differentially capitalists (whether individual corporations or broader capitalist coalitions) must successfully organise to deploy their power in ways that have at least one of the following three impacts on the elementary particles of differential capitalisation:

1. Increase differential earnings
2. increase differential hype
3. decrease differential risk (Nitzan and Bichler, 2009; McMahon, 2022).

Bringing this insight into dialogue with Cochrane and Monaghan's (2012) activist-oriented reading of CasP, it arguably follows that activists can inflict differential decumulation on their capitalist adversaries (whether individual corporations or broader capitalist coalitions) through the deployment of tactics that have the opposite impact on the latter's elementary particles of differential capitalisation. Namely:

1. decreasing the target's differential earnings
2. decreasing differential hype
3. increasing differential risk.

Cochrane and Monaghan argue persuasively that, by waging political economic disruption campaigns (PEDCs) targeting specific corporations/corporate coalitions, social justice activists can precipitate periods of differential decumulation in their capitalist adversaries. Cochrane and Monaghan's analysis focuses mainly on how such campaigns can precipitate differential decumulation via the vector of differential risk. However, to the best of my knowledge, they do not explicitly consider whether activists can disrupt accumulation by challenging capitalist power via the remaining elementary particles of differential capitalisation (i.e. differential earnings and differential hype).

My theoretical-empirical analysis of the UK fracking conflict suggests that, in the context of EDC and fracking conflict, the elementary particles of *differential hype* and *differential risk* are especially implicated in capitalist vulnerability concerning the uncertainty surrounding forward-looking differential accumulation. This finding emerged from my quantitative analysis; specifically, the discovery of an extremely loose relationship between key fracking investors' (AJ Lucas and IGas) decade-long trends of differential decumulation and differential earnings. This finding, which suggests the elementary particles of *differential risk* and *differential hype* were more consequential vectors of differential decumulation for AJ Lucas and IGas than differential earnings, coheres with the highly speculative nature of fracking. Indeed, like all oil and gas exploration, exploratory fracking is animated by the

possibility/promise of future earnings, which may never actually materialise. This explains the general thrust of UK anti-fracking coalition tactics, which sought to punctuate pro-fracking hype aimed at both the UK public and global investors, while inducing the latter to regard UK fracking as an unviable business prospect.

My analysis illuminates the deep interrelations between differential risk and differential hype; and their implications for capitalist vulnerability in the context of EDC/fracking conflict. These interrelations were most apparent in the struggle to shift UK public opinion on fracking. Thus, while the pro-fracking coalition deployed pro-fracking hype discourses with the aim of shifting public opinion behind fracking, the anti-fracking coalition deployed fracking hype deflation discourses to achieve the opposite. However, since both sides understood UK fracking would not be a viable business prospect without public support, this meant the struggle for public opinion was intimately tied to the struggle to influence investors' risk perceptions regarding UK fracking investment. This latter point is illustrated by the tight correlation between AJ Lucas and IGas' differential decumulation and rising public opposition to fracking (2013-2020).

The highly speculative nature of fracking arguably serves to further accentuate capitalist vulnerability regarding the uncertainty surrounding future earnings. This uncertainty is especially acute for fracking investment given the geological challenges involved and the high levels of capital expenditure this requires. The steep decline rates of fracking wells create a treadmill dynamic where more and more wells must be drilled just to keep production flat. To finance these costly exploration, development, and production activities the fracking business requires a constant stream of investors. Pro-fracking hype discourses arguably plays a crucial role in securing such investment. However, as illustrated by my case study, because much of this pro-fracking hype is questionable, fracking capitalists – and their differential hype – are vulnerable to fracking hype deflation discourses. The highly speculative and capital/investment intensive nature of fracking also renders fracking capital – and its differential risk – vulnerable to activist tactics seeking to disrupt, delay, and increase the costs of fracking investment. The exactingly short investment timeframes of certain fracking

investors (e.g. the private equity capitalists that sought to attract a large integrated oil and gas corporation to purchase their UK shale assets) arguably served to further accentuate capitalist vulnerability to these sorts of tactics. These findings broadly align with Cochrane and Monaghan's (2012: 114) argument that if capital is understood 'as the quantification of claims over qualitatively complex social processes', it would be unwise to treat every corporation the same way. Consequently, given the diverse range of social and ecological assets that underpin capitalist earnings and capitalisation, the vulnerabilities afflicting each corporation/corporate coalition are going to be different (ibid.). As such, 'the same tactics cannot be reflexively used against different targets' (ibid.: 114).

Nevertheless, these general insights regarding the links between forward-looking differential accumulation, *differential risk* and *differential hype*, and capitalist vulnerability in the context of fracking conflict arguably apply to EDCs more broadly. Particularly those over mining and similarly capital-intensive forms of extraction (e.g. Mills, 2021; Coulton, 2022). As such, these insights provide important contributions to the EDC and fracking conflict literatures. As noted in Chapter 2, the idea that accumulation is never guaranteed, and the related insight that EDCs and environmental justice campaigns pose a risk to capital accumulation both feature prominently in the EDC literature (e.g. Scheidel et al., 2018; Temper, 2019b). For example, reflecting on the recent proliferation of EDCs, Schindler and Kanai (2018: 841) argue that 'as the search for remaining non-commodified resources intensifies, investors will be forced to territorialize capital in increasingly risky locales and ventures'. Nevertheless, despite being a recurrent theme within the EDC literature, risk is rarely theorised as a fundamental aspect of capital (accumulation). Consequently, the centrality of (differential) risk in the context of EDCs, and the accumulatory struggle more generally, remain underexplored in the literature. This is even truer for (differential) hype. As noted in Chapter 3, while some EDC studies do mention the word 'hype', these studies do not explicitly theorise the concept as a fundamental aspect of (differential) accumulation and EDCs (e.g. Ariza-Montobbio and Lele, 2010; Hanaček et al., 2022). Analyses of the differential risk-differential hype-fracking conflict

nexus are similarly absent in the fracking conflict literature, which much like its EDC counterpart, tends to theorise accumulation in Marxian terms drawing heavily on notions of primitive accumulation (e.g. Delgado, 2018; Hadad et al., 2010; Vandervoode, 2022).

6.2.2.2 Intra-capitalist conflict and capitalist vulnerability

As discussed above, my analysis of the UK fracking conflict supports Nitzan and Bichler's (2009) argument that there is no capital in general; but rather, multiple competing capitalist coalitions struggling to increase their relative power. My analysis also identifies the latter dynamic as an important source of vulnerability for capitalists engaged in EDC and fracking conflict. Indeed, when a capitalist coalition's extractive green-field expansion (e.g. fracking, mining etc.) efforts impinge upon other capitalist interests, this enables temporary alliances between the latter and environmental justice activists. As illustrated by the UK fracking conflict, these alliances can play an important role boosting activists' efforts to halt such expansion. For example, Ecotricity (the renewables energy company that joined the UK anti-fracking coalition citing the UK government's preferential treatment of fracking capital relative to onshore wind capital) boosted the anti-fracking coalition by providing valuable funding and strong discursive support. Similarly, landowning capitalists in Yorkshire with links to the ruling Conservative Party joined the anti-fracking coalition due to concerns they would be liable for the environmental clean-up from abandoned fracking wells.[78] This capitalist group's entry into the UK anti-fracking coalition arguably served to boost the latter's lobbying efforts in Westminster to the detriment of the UK pro-fracking coalition.

By elucidating the interrelation between intra-capitalist conflict, capitalist vulnerability, and the coalitional dynamics of EDC/fracking conflict, these insights have the potential to enrich EDC scholarship/debates. Existing EDC scholarship provides valuable insights

[78] Bringing Nitzan and Bichler (2009) into dialogue with D'Alisa and Demaria (2013), it might be argued these landowning capitalists were concerned the fracking business' strategy of differential accumulation by contamination would involve the shifting of environmental clean-up costs of fracking wells onto their (i.e. the landowners') balance sheet(s).

regarding the coalitional dynamics of EDCs and the ways environmental justice activists can increase their potency via strategic alliances with more powerful actors (e.g. Martinez-Alier et al., 2014; Martinez-Alier et al., 2016; Conde, 2017; Demaria, 2023). However, since EDC scholars tend to conceptualise capital(ism) in Marxian terms, largely eliding the intra-capitalist conflict that defines the struggle for differential accumulation (Nitzan and Bichler, 2009), the role of capitalist interests *within* environmental justice coalitions remains underexplored.

6.2.2.3 Oil and gas dependence: carbon capital's strength and weakness

Drawing on Di Muzio (2012, 2015), my analysis of the UK fracking conflict illuminates important areas of vulnerability for carbon capital in the context of EDCs. As stated previously, carbon capital denotes those capitalists whose differential power depends on the continued extraction and monetisation of oil and gas; and the perpetuation of energy-intensive forms of social reproduction that such extraction underpins. However, as illustrated by my analysis of the UK fracking conflict, this differential power, and its social reproductive foundations, are a double-edged sword for carbon capital, especially in the context of EDC. Indeed, such conflicts arguably increase carbon capital's vulnerability by raising public consciousness, concern, and anger regarding: the harmful social ecological impacts of (unconventional) oil and gas extraction; the grave implications of increasing social reproductive dependence on oil and gas; and carbon capital's reckless modus operandi of 'locking global society into a carbon-dependent future by continuing to capitalize oil and gas relative to its alternative energy sector rival' (Di Muzio, 2012: 375).

6.2.3 What are the implications of capitalist power and vulnerability for environmental justice activism and ongoing efforts to build a more just, sustainable, and equitable political economic order?

In addressing this question, perhaps a useful place to begin is the argument/finding that even the most powerful capitalists must endeavour, against opposition, to retain and augment that power (Nitzan and Bichler, 2009). Capitalists power is not unlimited and differential accumulation is never guaranteed. Indeed, the inherent uncertainty surrounding forward looking differential accumulation creates vulnerabilities for

capitalists that social and environmental justice activists can and regularly do exploit (Cochrane and Monaghan, 2012). This is illustrated by the UK pro-fracking coalition's decade-long, ultimately unsuccessful, efforts to increase its differential power via green-field fracking growth; and the UK anti-fracking coalition's crucial role in helping precipitate this outcome. My analysis suggests capitalists seeking to accumulate differentially via controversial extractive green-field expansion (e.g. fracking, mining, logging etc.) are especially vulnerable to diverse PEDC tactics that increase differential risk and/or reduce differential hype. However, as suggested by the interrelated struggles to shift UK public opinion on fracking and influence investors' perceptions regarding UK fracking's financial viability, these two elementary particles are deeply interrelated.

The overarching strategic logic/thrust of the UK anti-fracking campaign suggests activists were cognisant of these interrelations, even though they did not express this in the language of CasP or refer directly to these elementary particles. CasP (Nitzan and Bichler, 2009) and carbon capitalism (Di Muzio, 2015) are marginal within academia, so most environmental justice activists are unlikely to have encountered these theories. Nevertheless, as this thesis illustrates, through their struggles against (dominant) capital, environmental justice activists are afforded numerous insights into contemporary capitalist power and carbon capitalism. While these insights are broadly aligned with a CasP analysis of capitalist power, they also enable deeper understandings of capitalist vulnerability in the context of EDC/fracking conflict. My finding that UK anti-fracking activists, through a diversity of tactics, successfully drove up the differential risk of UK fracking investment broadly supports Cochrane and Monaghan's (2012) activist orientated CasP analysis. According to the latter, successful PEDCs require activists to deploy diverse tactics to insert themselves 'into the accumulatory process, to become risk factors that must be accounted for' (ibid.: 105). However, my finding that punctuating fracking hype (aimed at both the UK public and global investors) was strategically connected to the goal of driving up the risks of UK fracking investment provides new insights into the relationship between PEDCs and the elementary particles of differential capitalisation. Rooted in UK anti-fracking

activists' strategic praxis, further enables CasP, following Cochrane and Monaghan (2012: 96), 'to theoretically catch up to [activist] practices on the ground'. Therefore, my analysis of capitalist power/vulnerability in the context of EDCs suggests environmental justice activists have more chance of successfully halting harmful green-field expansion if they deploy a diversity of tactics that impact their capitalist opponents thus: (a) driving up their differential risk; and/or (b) reducing their differential hype. However, given the strategic thrust of UK anti-fracking activism, and the fact that many environmental justice campaigns do manage to successfully halt the harmful projects they oppose (e.g. Scheidel et al., 2020; Temper et al., 2020), I am reticent to direct this implicative advice towards environmental justice activists. Nevertheless, while it is only a modest contribution, perhaps the most constructive implication of my analysis for environmental justice activists is to demonstrate the analytical value of understanding capitalist power, accumulation, earnings, risk, and hype in differential terms. The anti-fracking activists I encountered during my fieldwork generally relied on absolute values, typically fracking company share prices (e.g. AJ Lucas, IGas etc.), to gauge the effectiveness of their campaign. However, although absolute financial quantities can (and did) provide activists with useful information regarding the impacts of PEDCs on corporate adversaries, the differential nature of capitalist power means that relative values (e.g. differential capitalisation, differential earnings etc.) will always provide a more accurate picture; especially over the medium-longer term (Cochrane, 2023: Personal Communication).

Related to the above, my analysis of intra-capitalist conflict in the context of EDC/fracking conflict (e.g. fracking capital vs onshore wind capital) has another interesting implication for environmental justice activism. Namely, this analysis suggests environmental justice activists can, in certain instances, increase their chances of successfully halting harmful green-field expansion by forming temporary alliances with capitalist actors whose interests are also threatened by such expansion (e.g. landowners whose financial interests are threatened by fracking). This insight is especially useful for scholar-activists engaged in EDCs and environmental justice campaigns because it illustrates the potential to forge broader alliances/coalitions that

can have more chance of halting commodity frontier expansion (Moore, 2015). However, these benefits notwithstanding, for obvious reasons, such alliances are unlikely to form the basis of 'radical transformations to sustainability' (Temper et al., 2018a: 1). For example, although the UK anti-fracking coalition successfully halted the expansion of the UK shale gas frontier, the diversity of this coalition renders it difficult for it to unite around an alternative vision for a future beyond carbon capitalism. Thus, while many within the anti-fracking coalition may be persuaded by PCS' vision for a 'radical energy democracy' based on collective ownership (PCS, 2017), this vision would likely hold less appeal for other constituents such as Ecotricity (the privately-owned renewable energy firm) or the large landowners in Yorkshire. Thus, while environmental justice activists can ally themselves with certain capitalist interests for the purposes of winning EDCs, those interests are unlikely to support subsequent efforts aimed at catalysing radical sustainability transformations.

My finding that the UK anti-fracking coalition were instrumental in the failure of UK fracking is broadly consistent with existing EDC scholarship detailing the important role of environmental justice activists in halting socio-ecologically harmful projects (e.g. Temper et al., 2018a; Scheidel et al., 2018; Scheidel et al., 2020). For example, a recent meta-analysis of 649 place-based resistance campaigns (documented in the EJAtlas) targeting both fossil fuel and low-carbon energy projects found that over a quarter of these conflicts had resulted in cancellations, suspensions, or delays (Temper et al., 2020). Much like my own findings/analysis, the latter and other recent EDC studies (e.g. Scheidel et al., 2020) emphasise the importance of tactical diversity in ensuring place-based resistance campaigns have the best chance of successfully halting harmful green-field growth projects. However, by elucidating the relationship between tactical diversity, the elementary particles of differential capitalisation, and capitalist power/vulnerability in EDCs this thesis closes the gap between two distinct, albeit intersecting, tendencies within the EDC literature: namely, that which (primarily) seeks to elucidate capital's role as fundamental driver of EDCs (e.g. Demaria, 2017, 2023; Schindler and Kanai, 2018; Schindler and Demaria, 2020); and that which (primarily) considers how environmental justice activists can win EDCs while contributing towards

the ‘radical transformations to sustainability’ that are so urgently required (e.g. Temper et al., 2018a: 1).

Notwithstanding the importance of PEDCs for halting harmful green-field expansion (e.g. Scheidel et al., 2020), my analysis of capitalist power and vulnerability in the context of EDC and fracking conflict broadly concurs with Cochrane and Monaghan’s (2012: 114) argument that there are limits to what such campaigns can achieve ‘in terms of challenging capitalism itself’. Indeed, since accumulation is always differential, any successful PEDC against a particular corporation or corporate coalition will, necessarily, also serve to boost the differential power of rival capitalists relative to those being targeted (ibid.). Moreover, in the absence of dismantling carbon capitalism’s juridical, ethico-political, and social reproductive/energetic foundations, all PEDC victories are going to be partial ones (ibid.; Di Muzio, 2015). For example, while the UK anti-fracking coalition achieved an important victory against their pro-fracking adversaries, the UK state of carbon capital and carbon capital remain intact. This is illustrated by the UK government’s recent announcement of its plans to significantly expand oil and gas licensing in the North Sea:

> Hundreds of new oil and gas licences will be granted in the UK, the Prime Minister has confirmed today…, as the UK Government continues to back the North Sea oil and gas industry as part of drive to make Britain more energy independent (Prime Minister's Office, 10 Downing Street and Department for Energy Security and Net Zero, 2023: Online).

As indicated by the above reference to energy independence, a key aspect of carbon capital/the UK state of carbon capital’s resilience is the deep dependence of contemporary high-energy modes of social reproduction on oil and gas extraction (Di Muzio, 2015). However, as stated previously, this situation is a double-edged sword for carbon capital. Especially given growing public disquiet, concern, and anger regarding such dependence and the ongoing efforts of carbon capital to perpetuate it. Alongside my findings that EDCs enable activists to expand their understandings of capitalist power/carbon capitalism *and* the geographical scope of their alliances and inter-place

solidarity, this growing public disquiet provides a degree of hope.[79] For such knowledge and inter-place solidarity are going to be crucial to any political project seeking to dismantle the juridical, ethico-political, and social reproductive/energetic foundations of carbon capitalism (ibid.; Di Muzio, 2015). As Cochrane and Monaghan (2012) note, while PEDCs have yet to seriously threaten these foundations, it is hard to imagine how such dismantling might be achieved in their absence:

> Part of any transition will be a transformation of the political economic hierarchy. The vested interests will not simply disappear under the weight of their own contradictions. We can mess with them all we want, but if we cannot affect their ability to accumulate and augment control over social processes, then we have no hope of moving beyond the capitalist status quo (ibid.: 115).

In a context of rapidly accelerating social ecological crises, transforming/dismantling carbon capitalism's political economic hierarchy and energetic/social reproductive foundations have never been so urgent.

6.3 Contributions

While addressing my three research questions, the above discussion highlighted numerous theoretical contributions to the various literatures that have informed this thesis. Abstracting from the specifics of this discussion, I will now focus more explicitly on this thesis' overarching theoretical and methodological contributions.

6.3.1 Theoretical contributions

This thesis' principal theoretical contribution has been to demonstrate the analytical and epistemological value of exploring EDC and fracking conflict though the lens of CasP (Nitzan and Bichler, 2009) and carbon capitalism (Di Muzio, 2015). This contribution is aimed primarily at the EDC literature; an environmental justice activist-orientated literature which sits at the intersection of the cognate fields of EE and PE. This literature offers numerous insights regarding the intertwined political economic and socio-metabolic drivers and dynamics of EDCs. However, dominant explanations of EDCs also contain important blind spots regarding the role of capitalist power and

[79] We explore the importance of inter-place solidarity further in Lloveras et al. (2021)

vulnerability. These blind spots are embedded in the insightful but also problematic (generally Marxian) conceptualisations of capital(ism) which underpin such explanations; especially the assumption that accumulation can be achieved through 'economic' or 'extra-economic' means (e.g. D'Alisa and Demaria, 2013; Demaria 2023; Scheidel et al., 2018; Schindler and Demaria, 2020). Having identified similar issues within the fracking conflict literature (e.g. Delgado, 2018; Hadad et al., 2010; Vandervoode, 2022), this thesis sought to address these blind spots by mobilising a CasP and carbon capital inspired theoretical framework to explore EDC and fracking conflict. As illustrated by the previous discussion, this framework offers numerous theoretical insights regarding capitalist power and vulnerability in the context of EDC and fracking conflict; not only for scholars, but also for the environmental and climate justice activists engaged in such conflicts. Importantly, these insights do not necessarily negate those generated by existing EDC and fracking conflict scholarship. Rather, this thesis illustrates the possibility to enfolding these prior insights into a broader CasP and carbon capitalism inspired theoretical framework. Within such a framework, the intra-capitalist struggle for augmented differential power (Nitzan and Bichler, 2009) would constitute a fundamental driver of several other important phenomena (e.g. cost-shifting, appropriation, the search for Cheap Nature etc.) identified within EDC scholarship as key fomenters of EDC (e.g. D'Alisa and Demaria, 2013; Schindler and Kanai, 2018; Demaria, 2023).

This thesis also contributes to cognate debates in EE regarding value theory and the relationship between capital accumulation and accelerating social ecological crises (e.g. Pirgmaier, 2021, 2021; Røpke, 2021; Hornborg, 2022). Indeed, this thesis illustrates the possibility, and analytical benefits, of mobilising an alternative (non-Marxian) power theory of valuation to elucidate the driving role of (dominant) capital in accelerating social ecological crises (e.g. see also Baines, 2015; Cochrane, 2017; Bichler and Nitzan, 2020a; Di Muzio, 2015). Similarly, although this thesis has not engaged explicitly with parallel degrowth debates, these debates comprise many of the same concerns, themes, and scholars (e.g. Demaria et al., 2019; D'Alisa et al, 2014) that populate the EDC literature (e.g. D'Alisa and Demaria, 2013; Demaria, 2023). As

such, this thesis should also be of interest to degrowth scholars and activists interested in the political economy of degrowth transformations, which are only just beginning to engage with CasP (e.g. Vastenaekels, 2023, 2024).

Finally, as illustrated in the previous discussion, this thesis makes valuable contributions to the overlapping CasP and carbon capitalism literatures. First, it contributes to a growing stream of recent CasP scholarship exploring the interrelations between capitalist power and socio-ecological processes (e.g. Di Muzio, 2012, 2015; Fix, 2017, 2018; Fix et al., 2019; Bichler and Nitzan, 2020a; Cochrane, 2017, 2020). In doing so, it fruitfully brings this latter tendency into dialogue with more activist orientated CasP scholarship (e.g. Cochrane and Monaghan, 2012). Building on such scholarship, this thesis illuminates how environmental justice activists' PEDCs can achieve success not only by driving up their capitalist opponents' differential risk, but also by punctuating differential hype. Moreover, by analysing the accumulation strategies of relatively peripheral corporations, and their alliances with more dominant actors, this thesis also provides valuable insights regarding the coalitional dynamics of the accumulatory struggle and the 'strong gravitational force[s]' (Nitzan and Bichler, 2009: 18) they simultaneously generate and are shaped by. Relatedly, this thesis illuminates how analysing the differential accumulation of micro-cap firms such as AJ Lucas and IGas arguably also makes it easier to discern how such firms can, through their broader alliances, capitalise government power *and/or* the power of larger corporate allies. Finally, this thesis contributes usefully to the carbon capitalism literature. Like much CasP scholarship, the carbon capitalism literature's many insights tend to be derived from macro-scale analyses of capitalist power at the international and/or global scale (e.g. Di Muzio, 2015; Dow, 2019). However, this thesis brings many of these insights into dialogue with more granular analysis of place-based conflict over fossil fuel extraction. In doing so, it illuminates the links between such activism and broader movements seeking to transcend carbon capitalism and petro-market civilisation. Indeed, many of those who contest fossil fuel extraction are initially motivated by local concerns. However, through their struggles against carbon capital, many activists come to learn more about capitalist power and the energetic/social

reproductive realities of petro-market civilisation. Having embarked on this journey, many become strong advocates for system change based on the 'logic of livelihood and ecological sustainability rather than the logic of differential capitalization and the augmentation of capitalist power' (Di Muzio, 2015: 153).

6.3.2 Methodological contributions

This thesis offers two principle methodological contributions that arguably mirror one another. The first of these contributions, which broadly applies to both the EDC and fracking conflict literatures, is intimately connected to this thesis' overarching theoretical contribution: namely, to demonstrate the analytical value of exploring EDC and fracking conflict through the dual lens of CasP (Nitzan and Bichler, 2009) and carbon capitalism (Di Muzio, 2015). While most EDC and fracking conflict scholarship tends to rely principally on qualitative research methods (e.g. Demaria and D'Alisa, 2013; Demaria, 2017; Schindler and Kanai, 2018; Schindler and Demaria, 2020), this thesis combines such methods with the quantitative differential accumulation analysis that characterises CasP and carbon capitalism scholarship (e.g. Nitzan and Bichler, 2009; Baines, 2013; Di Muzio, 2015; Cochrane, 2015; Hager, 2016; McMahon, 2022). As I hope to have demonstrated in the preceding chapter, this methodological strategy can usefully illuminate the links between capital's quantities and qualitative power struggles that define EDC and fracking conflicts.

My second methodological contribution, which broadly mirrors the first, is to the overlapping CasP and carbon capitalism literatures. As discussed previously, most CasP and carbon capitalism research is based on desk-based research methods. Typically, such research involves a sizeable amount of quantitative analysis concerning the differential accumulation of dominant capital groups. To elucidate their quantitative findings and the changing power distributions these express, CasP researchers typically undertake further desk-based research; this time using qualitative methods (e.g. Nitzan and Bichler, 2009; Baines, 2013; Cochrane, 2015; Hager, 2016; McMahon, 2022). Although this thesis also involved desk-based research methods, both quantitative and qualitative, a key methodological innovation was to combine these

with ethnographic methods broadly influenced by standpoint theory (Harding, 2004, 2015) and the extended case method (Burawoy, 2009). This methodological innovation generated an extremely rich and diverse data set, which proved very useful for illuminating capitalist power and vulnerability in the context of the UK fracking conflict. While fieldwork-based qualitative methods are uncommon in CasP and carbon capitalism scholarship, I hope this thesis has demonstrated their value for exploring the qualities of capitalist power.

More broadly, this thesis also provides methodological insights for researchers aiming to conduct politically engaged research that does not elide its ethico-political orientation while maintaining an 'epistemic accountability to the real' (Kukla, 2008: 285). My synthesis of feminist standpoint theory (Harding, 2015) and the extended case method (Burawoy, 2009), which emphasised the importance of reflexivity and a constant dialogue between theory and data, constitutes a useful methodological heuristic for: (a) successfully navigating the inherent tensions of politically engaged research; and (b) providing a coherent epistemological justification for such research against accusations of bias. Indeed, contra arguments that politically engaged research risks undermining the objectivity of research findings (e.g. Hammersley, 2005), this thesis hopefully illustrates how, if due caution is taken, such engagement can confer epistemological advantages.

6.4 Recommendations for future research

As argued previously, this thesis has illustrated the analytical benefits of exploring EDCs through the lens of CasP (Nitzan and Bichler, 2009; Cochrane and Monagan, 2012) and carbon capitalism (Di Muzio, 2015). While representing the first attempt at such theoretical-empirical exploration, this thesis only focused on one specific type of EDC: fracking conflict. However, given that the academic literature and the EJAtlas are replete with examples of different types of EDC (e.g. Del Bene and Ávila, 2023; Walter et al., 2023; Martinez-Alier, 2023), this leaves ample scope for future theoretical-empirical exploration in the direction(s) suggested by this thesis. For example, future studies might draw on CasP and/or carbon capitalism to explore conflicts over various

forms of metals and mineral extraction (gold, lithium, cobalt, titanium, coal etc.), plantation agriculture (e.g. sugar cane, soybeans, palm oil, cattle pasture etc.), energy-intensive fishing (Martinez-Alier, 2022). In a context of so-called 'energy transitions' (Dunlap, 2023), extending this thesis' theoretical-empirical project to explore conflicts over renewable energy technologies (e.g. Dunlap and Arce, 2021) and the extraction of minerals on which those technologies depend (e.g. Meira et al., 2023) could be especially illuminating. At the other pole of the social metabolism, waste conflicts (e.g. Demaria, 2023) are also ripe for the type of theoretical-empirical analysis deployed in this thesis.

As argued previously, the dialectical relationship between capitalised power and resistance – wherein such 'power is always imposed against and indeed creates its own opposition' (ibid.: 16) – suggests that capitalism 'must, almost by definition, develop with some permutations across different societies' (ibid.: 16). As such, there also remains considerable scope for further CasP/carbon capitalism orientated theoretical-empirical investigations of fracking conflict in other spatio-temporal contexts. Given that this thesis is based on research undertaken in the UK, a relatively affluent 'democracy' in the Global North, I would especially encourage other EDC and fracking conflict scholars to undertake similar research in dissimilar socio-spatial contexts (e.g. in Global South countries).

Finally, for researchers already working with the CasP approach, I would encourage future investigations that build on this thesis by further exploring the complex relationship(s) and alliances between dominant capital groups and more peripheral capitalist actors. Similarly, this thesis has only just scratched the surface of the increasingly important role of privately owned capital (e.g. private equity firms) in contemporary capitalism. Future CasP research may seek to investigate this role further to enrich extant understandings of capitalist power and vulnerability in the twenty-first century. Finally, this thesis' emerging insights regarding the importance of 'hype' punctuation in PEDCs arguably provides a platform for activist-orientated CasP scholars (e.g. Cochrane and Monaghan, 2012) to extend these insights through further theoretical-empirical investigation. Arguably, this point also applies to those scholars

that have recently drawn upon CasP (Nitzan and Bichler, 2009) alongside valuation studies (Muniesa, 2011) and other literature sources to explore how activists can exploit capitalist vulnerability to disrupt, or better yet halt, the expansion of extractive infrastructures (e.g. Pasternak et al., 2019; Benton-Connell and Cochrane, 2020).

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Appendices

Appendix A: Previously published works this thesis draws upon

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Appendix B: Interviewee information

Interview number	Interviewee information: gender (optional)/age(optional)/self-described role, affiliation, occupation etc. (optional)	Place of residence (optional)
1	Produces a well-known anti-fracking website	Not stated
2	Female/47/Nana. Hairdresser	West Lothian, Scotland
3	Female/54/Nana	Lancashire, England
4	Female/Anti-fracking activist	Lancashire, England
5	Male/57/Retired Civil Servant. Frack Free Lancashire	Fylde, Lancashire, England
6	Female/49/Anti-fracking activist and Parish Councillor	Kirkham, Fylde, Lancashire, England
7	Female/43/Cantabrian Assembly Against Fracking	Cantabria, Spain
8	40/National Protector. No group affiliation.	PNR, Fylde, Blackpool, Lancashire, England
9	Female/70/Grandparents for a Safe Earth. Extinction Rebellion Elders	Bristol, England
10	Anti-fracking activist. Retired.	North Yorkshire, England
11	Male/Coordinator of NETPOL (Civil Liberties NGO)	London, England, UK
12	Anti-fracking activist	Not stated
13	Activist	Preston New Road, Fylde, Lancashire, England
14	Male/69/Retired former textbook author. Green Party Member.	Keswick, Cumbria, England

15	Local resident	Fylde, Lancashire, England
16	Female/69/Chair of residents group. Frack Free Lancashire.	Fylde, Lancashire, England
17	Female anti-fracking campaigner	Not stated
18	Male/40/Resident	Blackpool, Fylde, Lancashire, England
19	Anti-fracking activist	Not stated
20	Local councillor	Not stated
21	Female/69/Member of Local Friends of the Earth Group. Campaigner with Frack Free Lancashire.	Lancashire, England
22	Male/35/Full-time Campaigner.	North Yorkshire, England
23	Anti-fracking campaigner	Not Stated
24	Grassroots and NGO anti-fracking activist	Not stated
25	Male. Reclaim the Power activist	Bristol, England
26	Anti-fracking activist	Lancashire, England
27	Anti-fracking activist	Not stated
28	Trade Unionist. Greater Manchester Association of Trade Councils	Lancashire, England
29	Male. Environmental Campaigner and Retired Priest. Keep East Lancashire Frack Free	Lancashire, England
30	Resident. Borough Councillor	West Lancashire, England
31	Female/ Environmental campaigner	North Yorkshire, England

32	Male/48/Co-founder of Frack Free United	North Yorkshire, England

Appendix C: Supplementary Charts

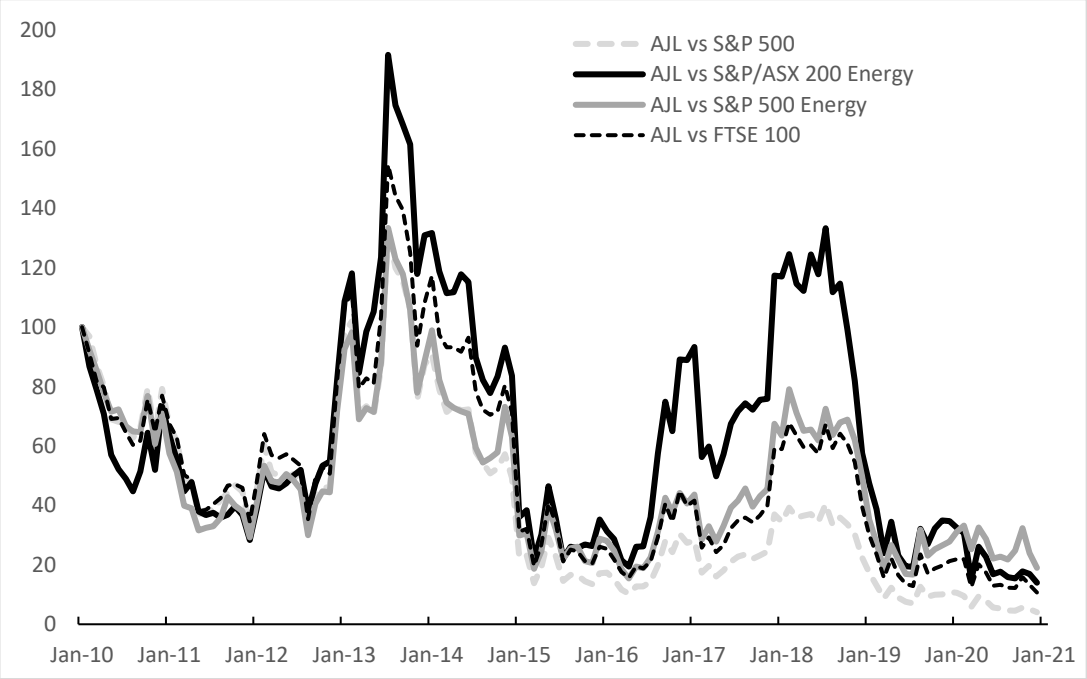

Figure C.1 AJ Lucas' differential capitalisation (relative to four selected indices), March 2010-March 2020
DATA: AJ Lucas, S&P/ASX 200 Energy Sector, S&P 500 Energy Sector, FTSE 100: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm
NOTE: These series are the monthly change in value of AJ Lucas and the differential market capitalisations (relative to the S&P 500, S&P/ASX 200 Energy Sector, S&P 500 Energy Sector, and the FTSE 100), with each index in the denominator

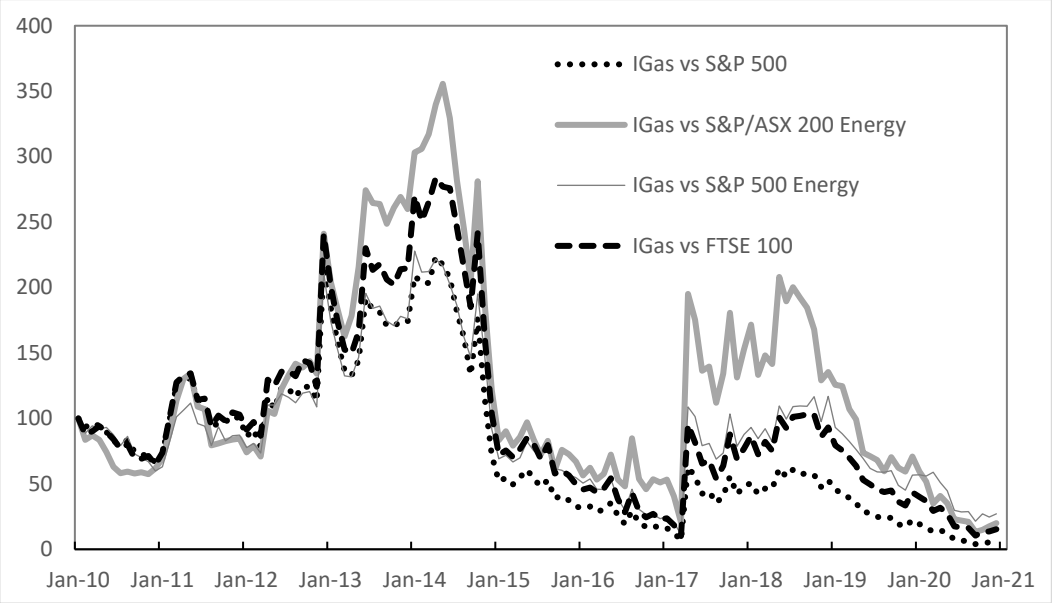

Figure C.2 IGas' differential capitalisation (relative to four selected indices), March 2010-March 2020
DATA: IGas, S&P/ASX 200 Energy Sector, S&P 500 Energy Sector, FTSE 100: S&P Capital IQ Pro; S&P 500: Online Data Robert Shiller. Available at: www.econ.yale.edu/~shiller/data.htm
NOTE: These series are the monthly change in value of IGas and the differential market capitalisations (relative to the S&P 500, S&P/ASX 200 Energy Sector, S&P 500 Energy Sector, and the FTSE 100), with each index in the denominator

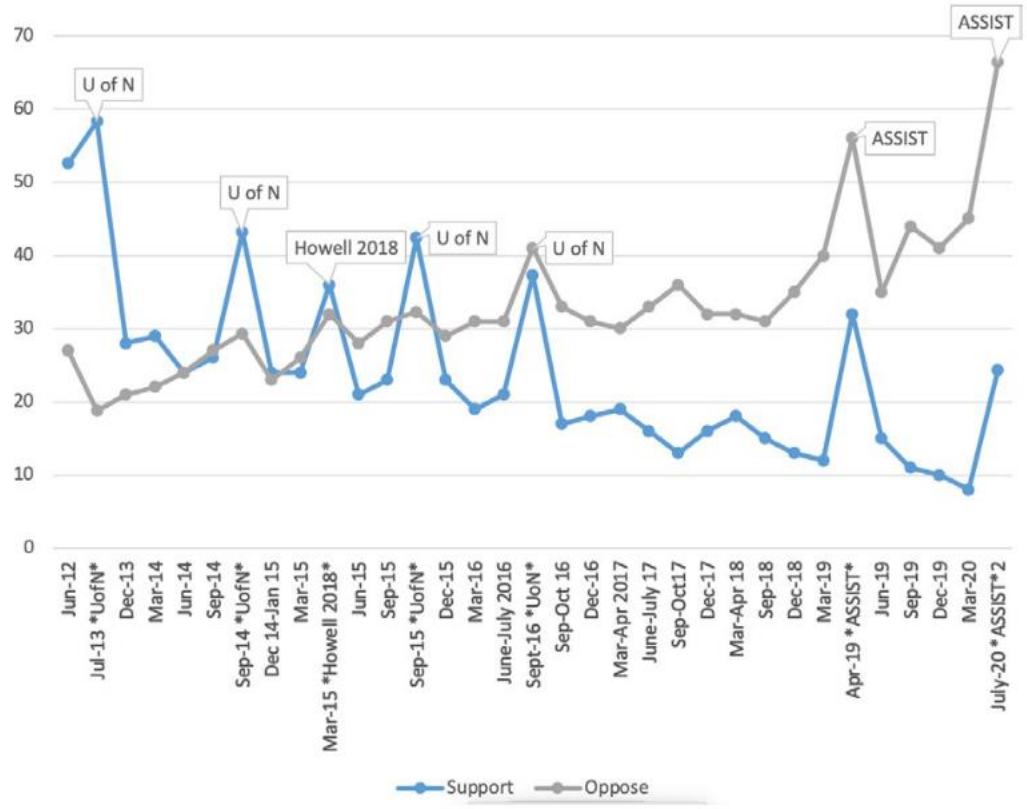

Figure C.3 Public Attitudes to Shale Gas 2012-2020
Source: Ryder et al., 2020: 9