Publics, Complexity and Social Futures: Blackouts, Infrastructuring and Maintenance

Georgia May Newmarch MA (RCA)

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Lancaster University

Abstract

In order to create futures that are resilient and allow for the incorporation of a 'bottom-up' perspective, transition is dependent on citizen engagement. This thesis presents a study of this engagement during moments of disruption, past and future electrical blackouts. Today, citizens are designing and self-organising community resilience and emergency 'services', partly out of necessity in austerity economies and partly due to a new sense of emerging sociability and solidarity. This thesis explores how publics engage with the future, deal with complexity and use modes of infrastructuring to maintain and create practices and action.

This thesis provides novel methodological tools for the study of futures and public engagement in our increasingly risky societies. A conceptual and methodological framework developed from empirical material; case studies of electrical blackouts in 1974 and 2015, alongside a co-creation workshop, pioneers a novel combination of disciplinary perspectives and insights. This methodological mix of orchestrating collaboration with diverse stakeholders and public engagement in research allows for new modes of futures literacy, not only for engaging with the challenges and opportunities of transition to low carbon energy systems but also how to approach other complex and potentially disruptive moments in the future. Bringing together multiple perspectives and timescales in the same thesis for thinking about Social Futures allows a way of engaging with post-disciplinary future forming research and begin to develop a futures toolkit .

Note

I declare that this thesis is my own work and has not been submitted in substantially the same form for the award of a higher degree elsewhere.

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Acknowledgements

When I found out I had been offered this PhD I was in charge of a ferris wheel in London. Now I am at the end of this journey that has at times felt like the wheel (going around in circles only to reach the conclusion that I should stop because I feel sick) the applause should be directed at all the people who have endured me, the PhD and its consequences over the past three years. I don't respond well to softness and sympathy and so thank you to everyone for being harsh and telling me to get a grip. I got that grip and I wrote a PhD.

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Cheers to Ellie and The Pod Pals who adopted me in the final months of submission; Cat for driving the getaway car; Ellen for being a best friend and supporting every stress induced purchase, answering ever call and reminding me that no matter how hard it is I've got 'this'. Thanks to Becca for another three years of eggs, chips and beans; Chris for being no help whatsoever and for letting me run away to Malta; Lawrence for the ridiculous jokes, singing and Berlin, Henry for allowing me to cry at them on Thursdays and Kaisu for being the best, we shall have cake to celebrate soon!! Special thanks to Jonny for not only all the great #content and but for all the advice, help and potatoes. You are my unofficial supervisor in life. If I hadn't had friends like you during this process, I don't know how I would have coped. Thanks as well to the A&E Department at Lancaster Royal Infirmary, who had to deal with my various broken bits. Does it still hurt when I type? In more ways than one. In this revised version of the thesis (the director's cut ;)), I need to add thanks to those who have helped me in Manchester to live a life that feels true to me, I feel at home and I feel like myself again.

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'Woke up with the power out, not really something to shout about'[1]

1.1 Introduction: Changing Circuits

Waking up with the power out may not cause mass panic, yet these moments of disruption provide a lens by which to view a key conceptual cluster of publics, complexity and Social Futures. In this thesis, electrical blackouts are taken as moments that develop understanding; not only for those publics who are experiencing the event, but also how we approach the future. In the Western Hemisphere, when the power goes out, we know, due to the infrastructures in place, that somewhere there will be someone fixing it. However, what we don't know; who is fixing it, who is responsible and when will the power will come back on, is what causes complexity to become visible and apparent to those who have not needed to understand systems prior. This is what causes distress amongst communities, causes rifts and an approach to what happens next that moves the question of 'what's going on?' to 'this should not be happening'. Certain moments in the future are knowable. For example, I will get older, I will finish this PhD. However, the uncertainties that accompany these actions create moments that are inherently unknowable. Will the planet be so hot in 12 years' time that I die of heat stroke? Will PhDs be dismissed by all future employers? Our knowledge of the future has limits and is limited by what we know. Disruption messes with these certainties, and an apparent future becomes visible in the present.

Throughout the writing of this thesis friends have messaged me saying 'It's happened again'. Did you know there's a power cut in New York and all the musicals on Broadway have been taken

[1] Arcade Fire, *Neighbourhood Three: Power Out,* (Rough Trade: 2005)

onto the streets?[2] Did you know there's a blackout in London affecting the trains and the traffic lights?[3] The use of case studies which focus on electrical infrastructures at a point of breakdown - the blackout – are not presented in this thesis as the definitive guide to what happens during a power cut, the technicalities and the socio-technical analysis of such. Instead, the rolling electrical blackouts in 1974; the disruption to electrical power caused by Storm Desmond in 2015 and a future electrical blackout scenario in 2056 are moments that allow for an exploration of complexity and demonstrate how publics approach the future.

This thesis could be as much about industrial action or Brexit as it is about electrical blackouts. It is about moments that appear to shift and obscure ways of thinking, seeing and doing in those presents. However, the future of such events is constructed in that present alongside new attitudes that develop with the disruption. These moments of disruption become individualised with members of publics having key agendas that they wish to serve. Having to travel on the bus to work in the morning because the train drivers are on strike affects your immediate future – you spend two hours travelling, you arrive to work late, you miss a meeting. Why is this happening? Do these workers know how much of an inconvenience their needs are on others? Yet, the wider effects of everyday actions in moments without disruption do not make you question the motives of such disruption prior to it happening. The train turns up at 7.23, you get to work on time, you can spend ten minutes scrolling idly through Twitter before you do any real work.

Things work, there appears to be no problem. However, there is. The trains are packed, the guards cannot do their jobs properly due to the congestion, more trains are put on to deal with this and more effort is required from the workers. Electrical blackouts are the best instances by which to view complexity and the issues of the future, as they demonstrate shifting ways of thinking and multiple courses of action. Increased levels of social complexity, communication and

[2] https://edition.cnn.com/2019/07/14/us/broadway-blackout-nyc-trnd/index.html

[3] https://www.telegraph.co.uk/news/2019/08/09/major-power-cut-across-country-london-goes-dark-national-grid/

capacities have been inseparable from rising levels of fossil fuel energy (Urry 2015). When something is physically taken away (the light, the electricity), infrastructures are viewed in different ways. The case studies of this thesis additionally present a clear timeline of the development of futures of the past, explored through the concept of the 'archive of the future' (Chapter 3.6). Infrastructural disruption provides important learning opportunities through which the politics of urban life, technology, and infrastructure can be seen in ways that are rarely possible when such systems are functioning normally (Graham 2010).

'Normality' renders certain flows invisible. What appears to work on the surface is a compacted view of a complex web of actions, legislation, infrastructures. Even though things appear to be working, they might not be. The lights may be kept on, however how they being so may not be the present that is wanted. This multiplicity of equilibrium states is **complexity**, the intricacies of moments need to be understood and approached in such a way that does not flatten the network, as this is where the tension between what the future is and what it could be come into play. The bigger behaviours and systems that emerge from small interactions - feedbacks across different system levels, openness and path-dependencies are important - to ignore these intricate, complicated relationships amongst the system fails to acknowledge and address all the issues at play.

In this thesis, the term **publics** is taken to mean members of a community who can be reconfigured to be 'members of a public', creating and reorganising the infrastructures around them. Publics are coproduced with issues (Marres, 2005) the nature of membership is reconfigured by the ongoing inclusion/exclusion of infrastructures, technologies and practices. Infrastructures as a topic of study are central to understanding systems and publics. Latour re-centred the debate around the concept, viewing power as an outcome achieved via the successful assemblage of networks, rather than a capacity of actors. The production of knowledge is shaped by the role of both human and non-human actors; objects are vessels through which Social Futures can become 'visible'. The non-human is not passive or inert, Latour rejects an attribution of power to particular actors (Harman 2009: 28), and does not consider the

force a concept that is mobilised to achieve an outcome. This relationship is not a flat ontology, and as this thesis demonstrates, both human and non-human actors may contribute to world-building, however, they do not always do so equally. This is why this thesis productively problematizes Latour's position in an empirical way and is why the concept of **infrastructuring,** attending to activities of organising and knowing relations (Karasti and Syrjänen 2004; Ehn 2008; Björgvinsson et al. 2010; Hillgren et al. 2011; Björgvinsson et al. 2012; Le Dantec 2012; DiSalvo et al. 2014) is used as a way to refocus complexity. The work of making connections, transporting, transmitting and holding together publics, embeds design within a community (Karasti 2014) and allows us to view infrastructures as settings that allow new ways of doing and being. Publics have a key role in this thesis, shaping the future scenario in Chapter Seven. A workshop was undertaken (section 7.2.2) to bring the importance of infrastructuring processes into scenario practices as a way to not only engage more actors with the futures they are a part of, but additionally how these futures are created.

By considering relational settings in which otherwise invisible infrastructures become actively visible, infrastructuring allows for a new way of opening up discussion. The case studies of electrical blackouts in this thesis are used to approach not only complexity but additionally repair and maintenance as well as futures literacy. Events such as 1974, 2015 and 2056 are more important in understanding infrastructures than actor network theory gives credit to, as these events highlight the importance of disruption on mundane and every day practices. The 'sociology of associations' is a conservative approach, and tends to actively avoid the study of breakdowns. A sociology of associations claims that there is no domain by which the label 'social' or 'society' can be attributed, that no 'social force' is available to explain the residual features other domains cannot account for (Latour, 2005: 4). Breakdowns highlight how there are social forces at play, some with more power than others. Considering infrastructuring processes in these moments highlights the importance of bottom-up resilience, the inter-dependence of publics with each other and the connections of systems and infrastructures. Infrastructuring also allows us to move away from the 'wicked problems' paradigm that renders issues 'unsolvable' (See Chapter 2.2).

Infrastructure is not just a set of mute layers holding up the systems we use, such as electricity grids (Star 1999: 378). Applying these ontological ideas to empirical research, within studies of critical infrastructures, has seen a development of infrastructure as a research tool and topic of study. Infrastructure invisible to one member of a society may be another person's main focus, through this acknowledgment that infrastructure is relational and embedded in a net of human activities and concerns, varying ways of seeing are needed to observe and understand events and phenomena that occur within these structures. Rather than viewing infrastructure as an object, infrastructuring is about the ongoing processes embedded in the structures as well as the socio-technical mechanisms for constituting and supporting a public (Le Dantec, 2013: 242).

Undertaking infrastructuring work develops resources and devices such as models, frameworks, guidelines and criteria (LeDantec and DiSalvo, 2014; Hilgren et al., 2016) this is demonstrated later in the thesis when the cases of 1974 (Chapter Four), 2015 (Chapter Five) and an exploration of maintenance (Chapter Six) provide a basis for a future scenario in Chapter Seven. The entanglement that occurs to designs whilst they are in use, such as adaptation, appropriation and embracing working relations (Bjorgvinsson, 2010: 43) implicates another central theme of this thesis, maintenance (Karasti and Baker, 2008; Twidale and Floyd, 2008; Pipek and Wulf, 2009). Infrastructure never stands apart from the people who design, maintain and use it. Its designers try to make it as invisible as possible whilst leaving pointers to make it visible when it needs to be repaired or remapped. This, as Star and Bowker (2003) point out is why it is tricky to study. A focus on breakdown in this thesis reveals otherwise hidden dynamics or practices of realities-in-the-making, maintenance, repair, infrastructuring and the emergence of publics created during and after moments of disruption.

1.2 Situating the Problem

The 2008 Climate Change Act committed the UK to a legally binding greenhouse gas emissions reduction target of 80% by 2050. This, combined with the goals of the Paris Agreement this

requires a significant switch in the ways in which everyday interactions with energy, governance and the environment occur (COP24). Tools have been developed to help understand this relationship such as the UK Governments pathways calculator; the impact of such tools is reliant on publics engaging with them in their everyday practices, not just as a superficial target.[4] This highlights the need for urgent, transformative change and engagement with the problem on an unprecedented scale, if global warming is to be restricted to 1.5°C.[5] For the UK, this implies achieving net zero emissions before 2050 (UKGBC, 2018). This is a huge challenge, requiring a deeper understanding of the nature of power and everyday encounters with complexity.

This is at the heart of challenges facing society, how they are understood and the actions that are taken as a consequence. Using electrical blackouts as a moment of disruption throughout this thesis, as illustrated by Figure 1, brings to light some of the problems, causes and consequences of failing to deal with such challenges related to climate change and environments, without the need for a detailed study of the issue, as this is not how the concepts are experienced by ordinary people. Blackouts are not only an example of systems breakdown, but additionally a demonstration of a lack of futures literacy. This thesis presents an analysis of the changing role of publics - the relationship between infrastructuring and fossil fuel power as a force that drives energy hungry lifestyles allowing us to see how action occurs during moments that highlight the visibility of futures. 'Business as usual' is not an option, many (Routledge 1994, Min 2019) have noted the increasing securitisation of the energy supply worldwide to avoid blackouts. Rather than something negative and to be avoided at all costs, electrical blackouts have a more positive pedagogical potential in thinking differently about infrastructures - with the possibility of new and re-orientated publics emerging from them.

The idea of the future is connected to ideas of time. Using case studies of past, present, future to consider complexity demonstrates how futures happen and how the ‘futures of the past’ are

[4] https://www.gov.uk/guidance/2050-pathways-analysis

[5] https://www.ipcc.ch/sr15/

exhibited in the present (this is explored through the use of the 'archive of the future' (see chapter 3.4). Futures happen everywhere, however futures constructed in particular settings present visions of the future that serve different publics and organisations. These visions are explored in Chapter Two. Coughlan & Prokopoff (2004) claim that we should engage fully with activities that allow us to prepare for the unpreparable, and while supporting this position, Dator (1996) suggests that the fundamental unpredictability of the future does not mean that we should not concern ourselves with it. Through engaging with the future, we may be able to identify and develop strategies that allow a consideration of how they may be an integral element of such futures (Lindgren & Bandhold 2003; Johansen, 2007, Rescher, 1997). How we engage with the future requires experimentation that presents multiple events, methods and action as central to working with complexity.

An approach involving complexity is important as it challenges the fundamental assumptions of discipline-based views of social phenomena, to generate a broader understanding of the world around us presently and in the future. Effective in understanding the connected world of the Anthropocene and the problems that are difficult to address because of incomplete, contradictory and changing dynamics, often tangled up, difficult to recognise and difficult to address from within one disciplinary boundary. Acknowledging the design of systems, and their contradictory and changing requirements requires a post-disciplinary exploration of Social Futures (Chapter 2).

This thesis was undertaken in an Institute of Social Futures, an institute created to improve thinking, visioning, analysis and data relating to futures.[6] This thesis seeks to understand the relationships between research and lived experience of past, presents and futures. Key theories and methods stem from the disciplines of Design, Futures, History and Sociology. Providing theoretical grounding, new perspectives and context; through creatively exploring the systemic complexities of disruption and infrastructuring. Figure 1 maps the complexities of electrical

[6] http://www.lancaster.ac.uk/social-futures/

blackouts as a moment of disruption. Primary and secondary root causes and their consequences have been mapped. The issues have been simplified for the sake of the graphic, yet the myriad of connections demonstrates how factors cannot be easily separated, and form a matrix of infrastructure and publics.

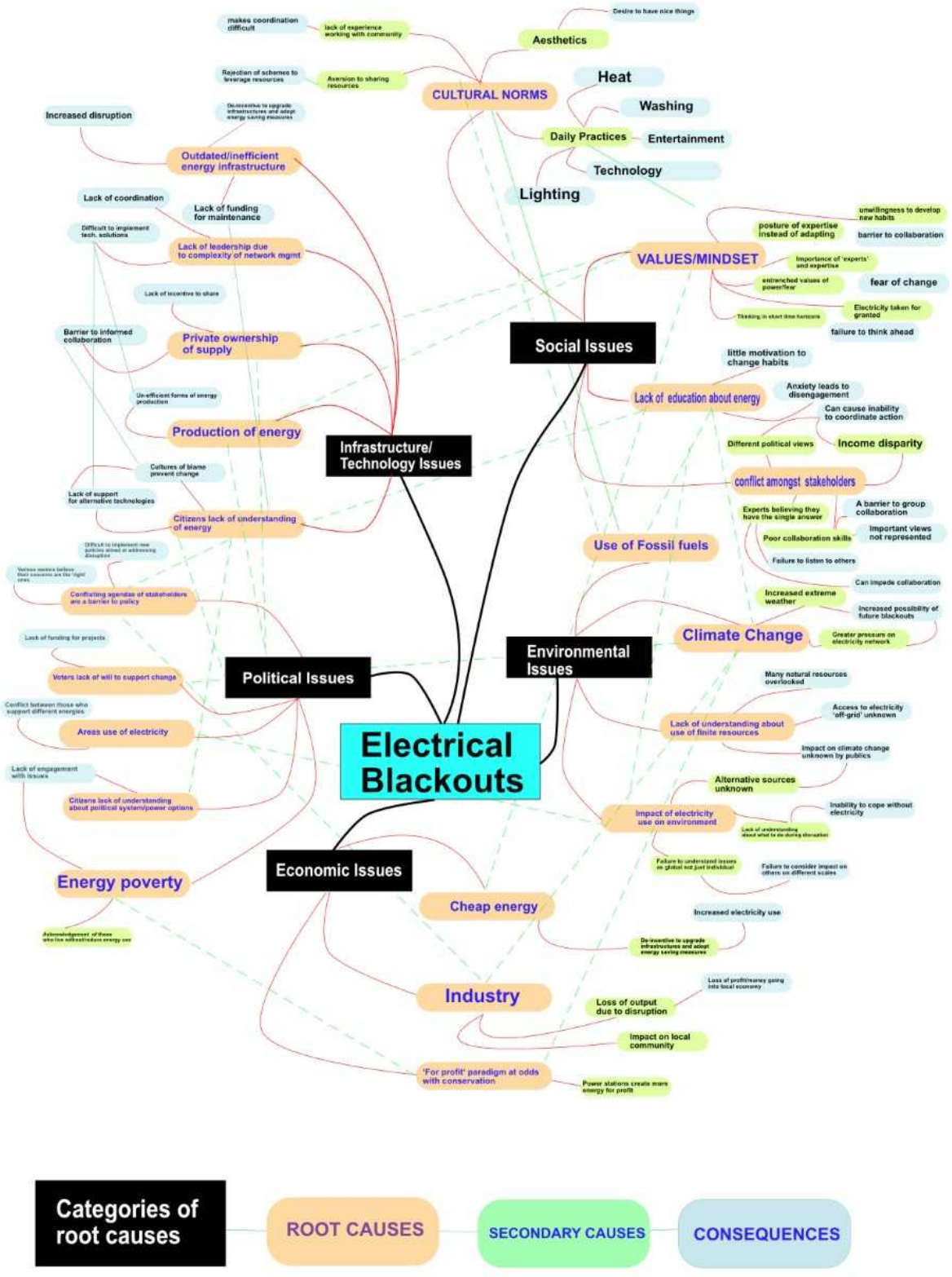

Figure 1: Mapping complexity: the electrical blackout

This approach enables new creative leverage to gain insight into how complexity is understood and how futures occur. We are living in an age where the threat of catastrophe looms in political rhetoric, however, for many the catastrophe will never come. If disruption does occur life will often seemingly 'go back to normal' soon after. Short lived power outages bring into view the ways in which activities and concepts are situated in contested ways. Breaking the problem down into its various forms, separate parts, categories and themes has its benefits; this research does not take this approach, demonstrating how systems are mobilised and the dynamics of the future exist. Innovation cannot produce 'solutions' and is a methodology that often renders connections invisible, adding to the invisibility of complexity that allows everyday life to continue 'business as usual'. Everyday encounters with complexity push 'future-making' to be much more attuned to memories, pasts, presents as it demonstrates the systems in play. This requires new methods to engage publics and to help them understand that problems pertinent to them fit into a bigger, messier, problem that needs to be addressed in a holistic manner for it to be useful.

In order to create better futures, greater literacy needs to occur. Futures literacy involves the skills that allow people to better understand the role that the future plays in what they see and do. Miller (2015) states the concept enables people, together, to appreciate the world more fully, to use the future to innovate the present. It is a step towards involving complexity into understandings of daily lives, creating better presents. This work is already being undertaken in various sectors, from foresight practices in business to government approaches to the future. Chapter Two addresses futures work currently in practice in detail, however briefly detailing here how futures studies has developed can help us situate this work as a study that addresses a key research gap in futures studies.

Futures studies as an academic discipline is presented in detail by Bell (1997). Bell presents the various schools of thought that have led to the current mode of futures studies since the beginning of the 20th century. Work on social trends has been undertaken by corporations since the 1920s, governance since the Russian Revolution, military futures since the 1940s, Toffler's *Future Shock* in the 1970s to the recent creation of futures journals. Dator's overview of the

discipline (2011) follows a similar timeline, viewing the development of futures studies as beginning in the post-war period, with policy beginning to embracing the future at the same time. The Atomic Age and science fiction obsession of the 1970's evolved into governmental foresight practices. Segmenting futures studies is common in overviews, Figure 2 highlights these key moments. The timeline demonstrates how futures studies has developed, as a discipline it has become embedded within official practices and each development serves as a building block for future research in the discipline. However, these approaches have often been from authorities and organisations – Governments, Military, Businesses. Approaching the future that involves the futures happening in practice, on the ground, by 'ordinary people' is a new aspect of the discipline that this thesis adds scholarship to through co-designing futures with those who experience them.

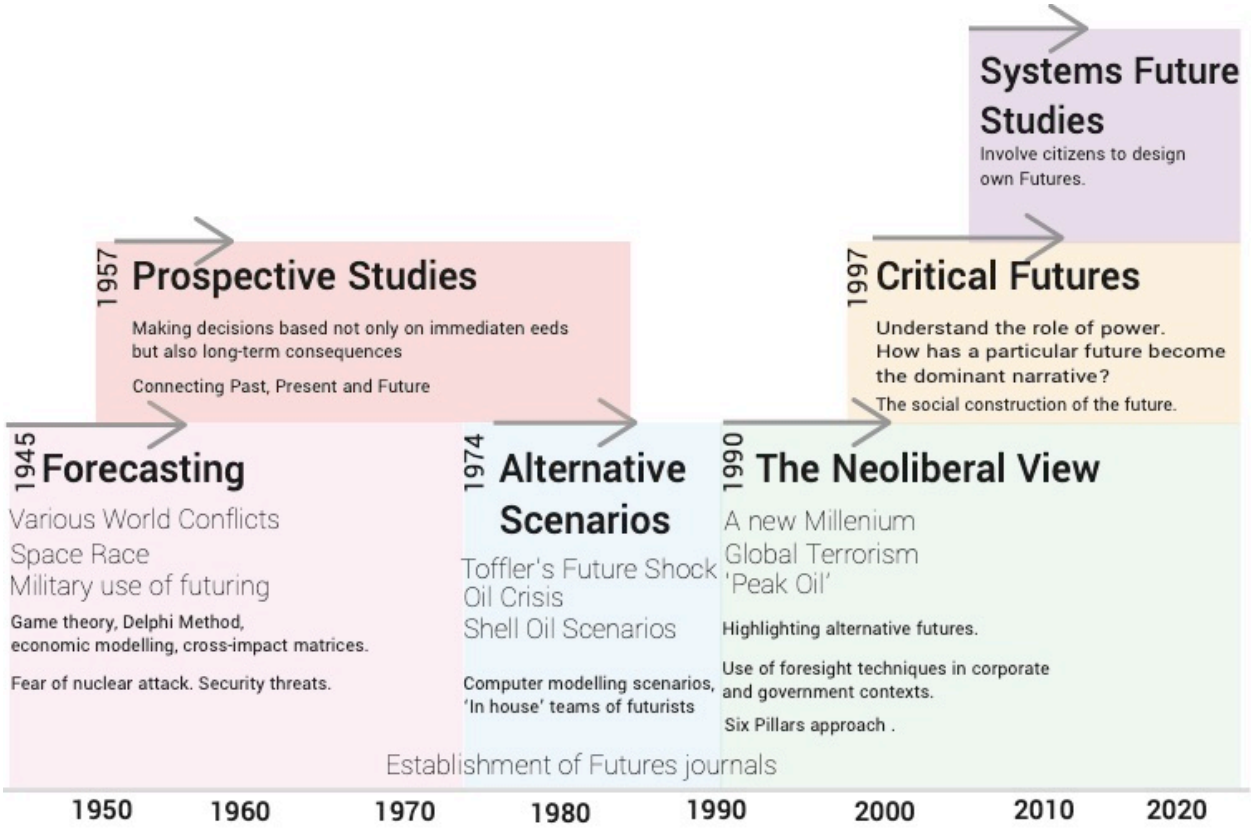

Figure 2: Key developments in Futures Studies

Futures literacy suggests that there is a point when an individual can be 'illiterate' in knowing the future, prior to obtaining knowledge. However, individuals are not illiterate if they do not know useful ways of approaching the future, rather the futures that they believe to be true are based upon a trickle-down structure they often do not have any say in adapting. Everyone *believes* something about the future, regardless of context, however it is how they learn about complexity that shapes their understandings. Ramirez and Wilkinson (2018) state that the future is now a useful fiction that allows those 'learning' to frame and reframe their present situations (xiv). This is key during moments of disruption, as individuals learn quickly, developing their own futures practices in the moment. Again, as Chapter Two explores in detail, futures have become a social process.

1.3 The Electricity Network in the United Kingdom

Infrastructuring allows us to move away from the material definition of infrastructure, if we were to look at the electrical blackout in this way we would see only power plants, substations, lack of current. Through a political lens we would see industries, residents and politicians. By considering multiple layers of physical, social and political we can begin to see the connections. A discussion of the development of the electricity network can aid our understanding of these connections. It is appropriate to briefly detail the history of the electricity network in the UK in order to demonstrate how these connections become embedded in daily life. Electricity embodies an evolving set of meanings and actors, as well as having strong cultural structures. These structures change when disruption occurs, having consequences that were not previously visible. In order to understand why electricity is important within this complexity, not only for its ability to be considered as the agent to demonstrate how tied up infrastructures become with their pasts, presents and futures.

Energy infrastructures laid down enormously powerful habitual patterns of life, a 'carbon-metabolic profligacy' that underpins what humans now are, and what they could and should do within the modern world (Urry 2015) Infrastructuring practices are formed in relation to the

history of the infrastructure itself. The energy system in the UK is 'the set of technologies, physical infrastructure, policies and practices located in and associated with the UK that enable energy services to be delivered to UK customers' (UKERC, 2009). This definition covers all of the equipment along the energy supply chain; generation, conversion, transportation, transmission, storage, distribution and end-use technologies. In 1974, the government was responsible for all aspects of the system. In 2015 there was a division of responsibility into a mix of government at national, regional and local levels; public bodies and private companies; regulatory frameworks and operating practices. The electrical grid of 1974 was not only the work of agents such as miners, the National Central Electricity Generating Board, politicians and oil fields, but was additionally a mixture of publics, the Welfare State, coal mines, power stations, wires, homes, engineers, technicians, light and generators to name a few components of the system. Today the electricity grid is no longer part of the 'the Welfare State', this political edifice has been dismantled by neoliberalism. Yet, much of the historical infrastructure and its design is still in place, having been transformed throughout the years with responsibility passed to different actors.

The reliance on the electricity network and widespread use of electricity in the UK first gained momentum in 1926 with the creation of the Electricity (Supply) Act.[7] This stipulated the creation of the Central Electricity Board (CEB), a governing body who were responsible for standardising the electricity system, operating the electrical infrastructure and expanding the network, which by 1933 became known as the 'National Grid'.[8] The CEB controlled, however did not yet own, power stations. The act aimed to create a more effective electricity system and provision for the interconnection of existing and future distribution systems. Before its creation there were 600 individual power companies in the United Kingdom with various voltages. Although electricity was not in the majority of homes until the late 1950s, the Act pushed the development and was

[7] https://www.legislation.gov.uk/ukpga/Geo5/16-17/51/contents/enacted

[8] Leslie Hannah. *Electricity before Nationalisation: A Study of the Development of the Electricity Supply Industry in Britain to 1948*.(Johns Hopkins Studies in the History of Technology, New Series, number 3.) Baltimore: Johns Hopkins University Press. 1979

responsible for the increase of electricity provision across the country. Hughes' work on large technical structures, takes the electricity network as its focus (1983). Writing on how electricity networks in America were shaped by pressure from governments, engineers and public opinion, Hughes states that these actors eventually bound themselves to the system as it grew: 'the system became larger and more complex, gathering momentum. The system became less shaped by and more the shaper of its environment' (Hughes, 1994: 108). For Hughes, within large technological structures the meaning of power was a constant interaction between 'senders' 'receivers' and the evolving technology itself. The processes of how technologies and technological systems gather and retain momentum play an important part in the forming of practices (Hughes, 1993).

The 1933 Act created a standardised AC grid. In order for electricity to become a power source throughout the UK, it not only needed the expansion of the grid – an increase in energy consumption was needed. Shove cites Bijker's concept of obduracy, a situation where social groups 'have invested so much in the artefact that its meaning has become fixed' (Bijker, 1997: 82). The role of energy consumers was vital not only to the meaning of energy, how it is used and what for, but also in increasing demand. Theories of social practice not only challenge the overriding emphasis on technological transitions and systems of supply, as well as the consequent technological determinism but also urge studies on consumption and energy demand to move beyond the individualist paradigm of consumerism.

Nye's work compares social development alongside technological development. In *Consuming Power,* he states that 'human beings select the machines they use and shape them to fit within different cultures' (1998: 3). State ownership of all major industries during the Second World War, resulted in the 1947 Electricity Act. This Nationalisation furthered the role of government and the state within the power networks in the United Kingdom. On 1st April 1948, a year after the nationalisation of the coal mines (then the central source of energy), 505 separate electricity generation and supply organisations transferred into state ownership. Through consolidation of the companies into fourteen area electricity boards, the Central Electricity Generating Board

(CEGB), nationalisation created a network of actors, both material and social. Coal power was the majority source of energy and government policy stressed the importance of the miner as vital to the 'reconstruction of Great Britain', without an increase in electricity it was thought plans for the post-war consensus would go awry.[9]

The design of the new Welfare State relied not only on the raw materials to generate power, but the electricity to advance Britain's social achievements, further enmeshing the importance of energy distribution. Thomson and Beck emphasize how path-dependence means that societies can be locked in to what is the 'wrong' technology for that period, and cannot escape from (2014: 31). This was the case with the energy system, as until the late 1960s with the introduction of nuclear and natural gas, the network was configured towards a reliance on coal. This had implications not only for the people involved in these industries, but also those in the home – cheaper electricity meant an increased number of appliances, increased consumption and greater reliance on the workings of the system. Democracy is linked to the material workings of industry and energy, the 'democratic machinery' is dependent on energy industries (Mitchell, 2011: 12). In the case of nationalisation of power in the Post-War period, social welfare was interlinked with visions of creating a better Britain through industry. The exploitation of coal not only created a system that relied on a finite source of carbon, but additionally created energy that caused mass politics - a force that Mitchell describes as a 'social energetic metabolism' (2011: 13). As the next paragraphs will show, politics in embedded within infrastructures.

Changing governments and shifts in policies away from heavy state-intervention saw the entrenchment of the complexity at play in this research. When considering the role of political leadership and the rise of neoliberalism, the Thatcher administration is often viewed as the point when state intervention shifted. However, as this thesis will demonstrate 1974 was the beginning of this shift. The Conservative loss to Labour during the time of the Miner's Strike in 1974 was heralded as a win for the mining communities, miners were not only playing a role in the creation

[9] National Coal Board, *Coal,* September 1947, 5.

of physical power, but additionally in the formation of social power and governance structures. Industrial disputes lent themselves to the argument that not only should there be a shift in the economic doctrine for the country but additionally a shift in the way Government provided public services. When Thatcher became Prime Minister in 1979 the long dismantling of the mining industry began, accompanied by the biggest and most violent strike since the Trade Union Congress (TUC) General Strike of 1926 – the 1984/5 Miner's Strike. At the same time, the United Kingdom was accessing North Sea natural gas; climate change began to be part of the political agenda of the government, for an easy move to 'Dash for Gas'.[10] Eventually, in 1990 the electricity network was privatised.

Privatisation reversed the Nationalisation Act of 1947 and from that, three new companies were established: Powergen, National Power and the National Grid. This privatisation of state-owned enterprise, and emphasis on competition and individual entrepreneurial practices is central to neoliberalism (Harvey 2005). Over the next two years the electricity network in the United Kingdom became a tool in enabling neoliberalism's 'zigzagging course' (Peck, 2013: 139). This course saw uneven spatial development (declining infrastructure investment) institutional polymorphism (there are six major energy suppliers and fourteen distribution network operators) resulting in 'a landscape littered with policy failures, oppositional pushbacks, and stuttering forms of malregulation' (Peck 2013: 140). Today, publics within the energy network focus on the parts of the infrastructure that support and guide a service or their behaviour. For example, the physical structures and the organizational structure are not considered when someone goes to turn the lights on in their home, undertaking this action does not require an understanding of the system. As this thesis will highlight, this is until the design of the framework is disrupted.

Framing the motivation of this thesis through the complex entanglement of infrastructuring encourages a way of viewing the future that combines many issues, designs and publics. As Bœrenholdt et. al. (2010: 2) note, it is misleading to view research as external to design, the

[10] https://www.kcl.ac.uk/sspp/departments/warstudies/research/groups/eucers/pubs/strategy-paper-14.pdf

relationship between the two is complex and requires critical enquiry. Design is as much a process, as a result. Chapter Two explores how framing the thesis as a mixed methods inquiry as a post disciplinary study opens up the modes of exploration. Chapter Three, the methods chapter develops the use of case studies in this thesis. Network theories have been advanced by the performativity of method and a shift to a post- actor network theory network (Michael 2018: 119). In Chapter Three the two case studies based on the notion of 'the event' are explored as a way of presenting post-disciplinary research, highlighting the methods used and how these relate to later chapters (Chapter 6 and 7) that deal with futures orientated work. The next section of this introduction will address the focus of the event, the blackout, followed by a detailed breakdown of the thesis structure.

1.4 Blackouts and Breakdowns

Throughout this thesis, disruption is not a dramatic breakdown, but rather a pause of the present. When I began this PhD, I did not anticipate that the topic of my study would become realised and a lived experience for me, yet in December 2015 Lancaster experienced a blackout. Only a few months into my research, at a time when my supervisors were pushing me to find examples of infrastructure breakdowns that I believed to be choice examples of disruption. To me, the blackout in Lancaster demonstrated the nature of disruption as just like the future, it cannot be approached as a known object with set causes, solutions and impacts.

The event required me to reflect on what I wanted this thesis to be. Figure 3, a selection of text messages received or sent during the blackout (prior to phone signal being terminated) demonstrates not only the novelty of the event but also the confusion. The need to find a way of understanding these events, not as the start of the 'zombie apocalypse' or a 'weird refugee camp' (figure 3) but rather a moment of the present that requires attention in order to anticipate different futures other than ones we currently expect. The case of 2056 is an important future scenario, as it demonstrates the motivations of this thesis, to look at futures using new methods. The case studies present a detailed understanding of going 'back to normal' after disruption and

how we understand the future. The text messages in Figure 3 were a form of local crowd communications infrastructuring that worked until the communications infrastructures stopped working. The importance and shock of the lack of communications highlights that there is a lack of awareness of the role publics play in systems and the self-destructive nature of humans within these various systems. Careful analysis of the 'symptom', in this case the electrical blackout, can highlight how points of disruption and perceived crisis can create a different model of understanding complexity.

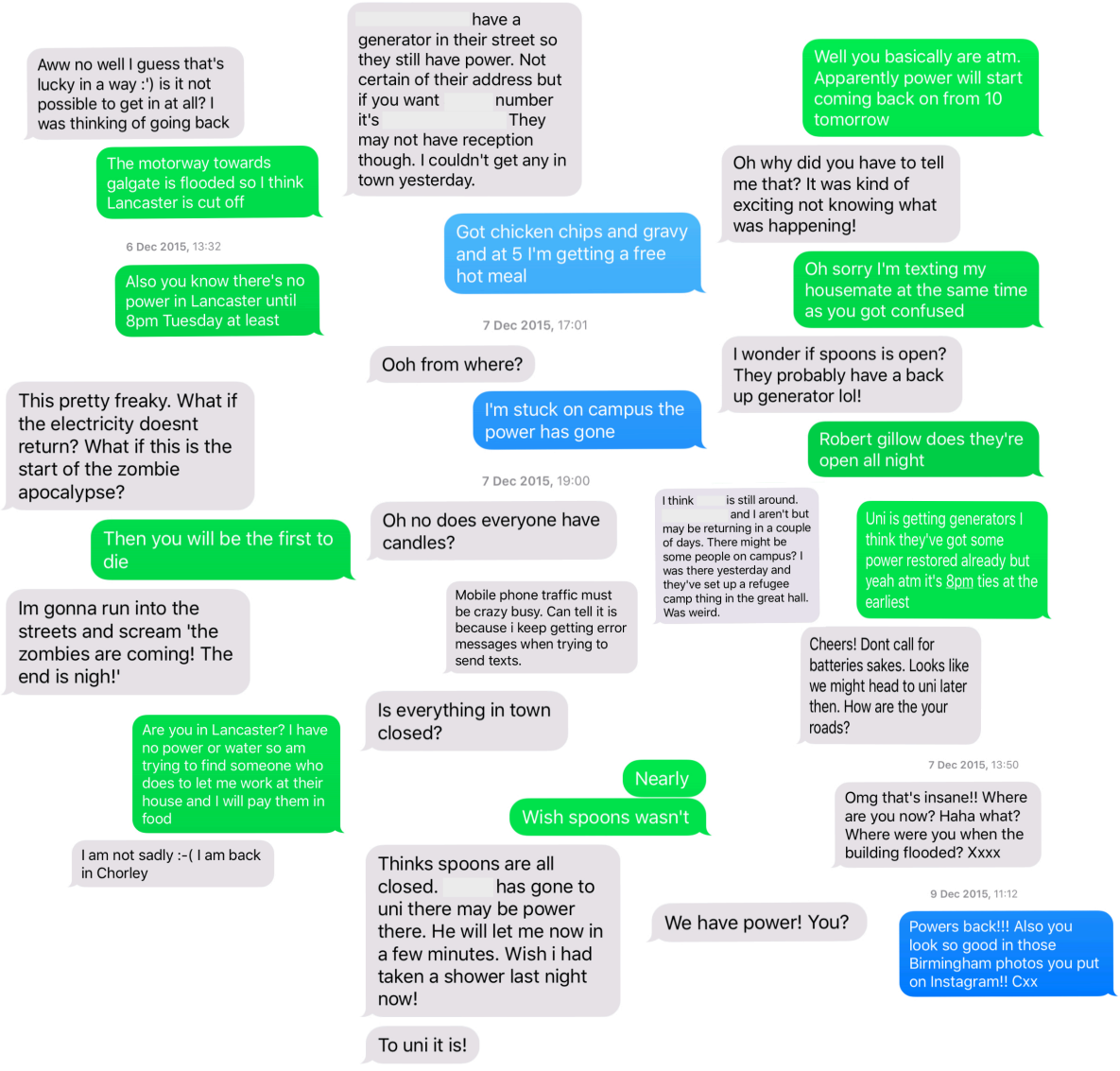

Figure 3: Texts received and sent to and from author during the 2015 Lancaster Blackout

Power cut, power outage, blackout or brownout, their definitions are contested by engineers and public alike. What is a power cut? The terms are often used interchangeably within literature and everyday life. In this thesis, 'blackout' is used to define the loss of electrical power within a certain area. Today, blackouts across the globe and occur for many reasons yet in Western Europe and the USA electrical blackouts that last for more than a few hours are rare.[11] The 2003 blackout that affected the North Eastern United States has been written about extensively by Nye (2010) and become a key example in infrastructure studies (Bowker, 2013; Graham, 2012). Often when explaining this thesis to others their initial response was, 'are you looking at New York?' However extensive the literature on that blackout may be, this thesis focuses on smaller moments of disruption, as these are often neglected in studies of power outages as they are small and happen without great visible consequence. This thesis focuses on blackouts in the United Kingdom; however, it is important to acknowledge the global phenomena and the nature of blackouts. The two vignettes below highlight how blackouts can differ dramatically in scale, highlighting the range of processes that become visible upon breakdown:

> On September 20th 2017, Hurricane Maria knocked the island of Puerto Rico into a total blackout. It took nine months for the majority of the island to gain power back, with 3.3 million residents suffering intermittent power throughout this time, with restoration set back by a lack of reliable generation supplied by private companies.
>
> On January 10th 2018, at the 2018 CES conference in Las Vegas, the largest electronics conference in the world, the power went out in the main hall. To highlight the novelty, delegates took to social media, in particular Twitter, to joke about the event. Participants suggested that next year the height of new technologies and innovative products would be a torch light.

[11] https://www.nationmaster.com/country-info/stats/Energy/Electrical-outages/Days

Both these blackouts were caused by extreme weather and a lack of maintenance (heavy rainfall caused the blackout at CES). Albeit on different scales, they demonstrate how a lack of power is either a novelty or a destructive force. The power at play within Puerto Rico, from private firms failing to restore power, the lack of communication and dissemination of the problems that were occurring on the island contrasts significantly with the CES event, where disruption was linked to the event alone rather than the wider area or community. Different societies will be affected differently by disruption, some as a dress-rehearsal for peak oil and climate change (Dennis and Urry, 2009) others as a mild-threat only remembered anecdotally. They also demonstrate the types and dimensions of breakdown we will see more of in the future. Blackouts both reveal and obscure different types of power and publics; there is a need to reflect comprehensively on these moments of disruption, as a 'pause' of not only the present, but additionally the future. A blackout is a highly complex phenomenon that connects global issues to everyday practice in a way that is otherwise not always easily visible, climate change, energy policy and the complexities of governance become something experienced by publics in a way that differs from prior to disruption. In this thesis, through the exploration of the 2015 blackout, extreme weather due to climate change is linked to local everyday practice. This is important as it demonstrates not only a problem that is increasing in frequency and more geographically diverse places, but also how practices undertaken by publics in small local situations have relevance beyond the local.

A review of key analyses of electricity here allows us to understand not only some of the context behind design decisions, as this highlights how electricity is not only central to everyday life through its integration into daily practices but additionally demonstrates how the past is embedded into systems, an idea that is central to this thesis. Hughes' work on the growth of the electrical power system, focuses on electrical networks as *systems* – 'coherent structures comprised of interacting, interconnected components' (Hughes, 1983: 5) – which help to develop other economic and social systems. For Hughes, context is key and in his notion of a technological system, much of the power of the idea of a technological community comes from its scope– the analytical value of the concept is lost if it is so large as to encompass everyone, or so small that it does not allow for comparison. Systems are shaped by and shape the society that constructs

them whilst connecting communities; this is why electricity is important to the study of Social Futures. It is a socio-technical system on which society depends upon in order for things to occur. Such power systems are not autonomous or free from influence – the system is shaped through 'technological style' (1977: 12) - factors external to the technology itself, such as geography, economics, legislation, and contingent historical events.

Here, the question of 'how do communities respond to disruption?' allows an exploration of the way in which change is considered in the moment, pausing the ideas of the future that existed prior to the event. The contextual elements of regional electrical power systems were shaped by the technical characteristics of the systems themselves, 'the factors complexly and systematically interact with technology and with one another' (Hughes, 1983: 405). He continues by asserting that individuals may be members of multiple communities at different levels; it is indeed at these boundaries that differences between publics can become apparent and why looking at electricity and Social Futures is important.

Similar accounts of the development of the national grid in Britain include Hannah's *Electricity before Nationalisation* (1987), which examines the development of the grid in the United Kingdom and considers it to be founded in the existing technological infrastructure and power stations that determined how the grid was organised on a national level, as opposed to a completely new system (Hannah, 1979). Hannah's approach is economic, focusing on the politics of Nationalisation. Hughes builds on previous historical work such as Hannah's by considering different spheres of human activity that impacts on the creation of networks; technical, scientific, economic, political and organisational. The character and meaning of a technology is contested and transformed through complex practices and processes. Nye states that today 'people notice electricity only in its absence', and when blackouts occur, 'people must live in the here and now' (2010: 133). This demonstrates how electricity causes people to think ahead, as it is only when power is removed that the present is considered, Nye's work creates a perspective which allows social development to be viewed alongside technological development. In *Consuming Power,* he states that 'human beings select the machines they use and shape them to fit within different

cultures' (Nye, 1998: 3). Humans are central to his approach, as they are in this study of Social Futures.

The historiography that considers the development of electrical networks in the United Kingdom limits analysis from the 1880s to 1940s, then analysis jumps to the end of the Nationalisation period in Britain and subsequent privatisation from 1979-1990. The relationship between electricity and people is one that continues to evolve and futures have been embedded into the electricity system since the early development of the national grid. The relationship between electricity and electronics could be considered another possible analytical avenue for this thesis, as electrical devices today steer our actions and are vital to our day-to-day living.

By tracing a partial history of the electricity network in the United Kingdom, the development and changing shifts in response, use, need and design of physical power allow us to see why using infrastructure failure in the form of electrical blackouts, to look at new forms of 'future-making' are important. Blackouts are events of public engagement, moments where communities are forced to acknowledge their place in disruption. Often the term 'community' can ignore the social dynamics and the multiple layers of meaning embedded in the term (Titz, Cannon and Kruger: 2018, 2). Previous work on publics has acknowledged that not all of those grouped together share the same ideas, perceptions and interests: conflict often exists within groups (Le Dantec and DiSalvo, 2013). Within an event, communities are not multiple actors working in the same way; studying the publics involved and their responses creates a multi-dimensional approach. This then allows the monopoly of infrastructure (Illich, 1973: 52)**,** to be challenged and thus create new publics. Infrastructure systems face a number of pressing challenges relating to demographics, environment, finance and governance pressures (Walsh, 2015: 10). The systems mediate the way in which everyday lives are conducted; their form and function creating a persistence of practice and behaviour that becomes difficult to change. This is why breakdowns of the system highlight not only what needs to change, but potentially how to amend the networks.

The blackout events in this thesis have been chosen for different reasons. 1974 is explored due to a need to re-examine the narrative of everyday life during the power cuts that occurred, rather than the political events that have shaped memories of the period. 2015 was chosen because it was a large-scale blackout that occurred only months into researching the possibility of future infrastructure disruptions. 2056 is a future scenario, identified as the time period for the event due to it being the same number of years after the 2015 blackout as the 2015 blackout was to 1974. Climate change calculations use 2050 as a target, placing the future scenario after this presents a possible reality of the outcome of these intended policy changes. Motivations are explored further in Chapter Three. The role of the electricity consumer during a blackout has developed significantly during the 20th Century, from the blackouts during the Second World War to power cuts during the 1970s as a result of industrial disputes, to the need to reduce electricity in 2015 to prevent further climate change. Standards are often set by organisational bodies and consumers need to adhere to these. Over the timeline of this thesis these organisational bodies include: Government, Electricity Council, CEGB, Norweb, Electricity Northwest, and local municipal bodies. These structures of governance will again be explored throughout the case studies.

Temporary breakdowns in the flow of events are important in understanding the norms, practices and technologies that construct the socially accepted definition of normality (Shove, 2003; Trentmann, 2009). These scholars take the view that practice can be seen as something that is separate and discrete when a breakdown occurs: people and tools are 'singled out'; creating a shift from object-object relation to the subject-object relation (Sandberg & Tsoukas, 2011). Previous literature on socio-technical dynamics has acknowledged that different disruptions in routines opens up the possibility of political debate on the processes of service provision, and how they potentially re-structure the relationship between the provider and consumer (Southerton et al., 2004).

No one factor can be 'singled out'; shifts are jagged, unable to solve or serve all problems and actors. Neoliberalism attaches itself to a variety of localised contexts as a transformatory process

rather than an end; a restructuring of the relationship between provider and consumer does not fully explain or provide a lens to address the ways in which change occurs after an event in a disrupted space. As the previous section (1.3) demonstrated, practices have been embedded within both physical and social systems for almost a century. Practice theory can highlight the importance of the disrupted space, yet an integration of wider factors that deal with the systemic dynamics is needed to address the future. These factors are on different scales and temporalities and need to be considered individually as well as part of a whole.

This thesis focuses on micro-practices during events, how people interact, the way they communicate with to each other, the mundane practices they undertake to discover the things that persons in a particular situation *do*, the methods *they* use, to create the patterned orderliness of social life amidst a pause of the presents in which they are living. These micro practices of power are often not addressed in terms of the 'wicked problem'. Practice theory takes small changes and focuses on one aspect of 'demand', rather than how it connects and feeds into a more complex web. This thesis embraces the web.

1.5 Thesis structure

There is no prescriptive structure for a post-disciplinary PhD. Presented in a conventional form, the path of this thesis follows a linear timeline, from past to future. There is no separate literature review, the nature of this research means that each chapter involves an analysis of the relevant literature pertinent to the discussion within the chapter.

After having outlined the broad aims of the research in this introduction, **Chapter Two** lays the theoretical foundation of the thesis. Considering what is wrong with the 'wicked problems' (Rittel and Webber, 1973; Morozov, 2013) theory used extensively in design research, it charts the need for future forming post-disciplinary research to embrace action and inventive methods in order to enhance current modes of knowing. This demonstrates the need for approaches within a doctoral thesis that move beyond disciplinary boundaries, exploring the reasons for adopting a post-disciplinary approach to complexity as a way of understanding publics and modes of infrastructuring. After providing an overview of futures thinking (Son, 2015; Slaughter, 2008) and why Social Futures fills a gap in futures studies, the sites and practices that highlight complexity are discussed. These theories open up the conversation of how to involve publics in futures and the importance of multiple time scales in this study, as well as how to work with the 'friction' that occurs in post-disciplinary work.

Chapter Three presents the methods used in the first two case studies. Beginning with an outline of the development of the research, it reviews the mixed methods approach taken in each case study and concludes with an in-depth discussion of the empirical methods utilised. Using mixed methods allows a rich repository of data to be gathered, to understand everyday encounters with complexity. Friction points are also considered. A review of the methods relevant to the topics at hand is presented, describing the approach and strategies taken, presenting a case why specific cases were chosen to address the issues in Chapter Two. The chapter concludes with a review of

the limitations of this approach. In doing so, it considers how methods are central to new modes of futures literacy, the questions of 'doing' methods and the issues encountered.

Chapter Four presents the first case study, the rolling blackouts of the 1974 'Three-Day Week'. Viewing the events of 1974 from a national perspective enables an image of how the constant threat of large-scale power cuts played out within everyday life and popular culture. The chapter details the sense of crisis and the rhetoric used throughout the disruption. It highlights the way in which memory is vital for understanding disrupted moments of time. The chapter concludes by introducing the ideas that demonstrate how Social Futures are constructed through maintenance of knowledge, through the ways in which the event had an impact on the Government's environmental policies. This chapter addresses the literature that relates to relationship of publics to infrastructure, power and disruption from a historical perspective (Black, Pemberton, Thane, 2013; Beckett, 2010; Forster, Harper, 2010; Turner, 2010; Sandbrook, 2010) addressing the importance of social actors in the materiality of the grid. This chapter uses footnotes to reflect the use of archives.

Chapter Five examines the ways in which disruptions are varied and the sociological, historical and design importance of considering different types of power disruption together (Nye, 2011; Cubitt, 2013), whilst considering social imaginaries of blackouts (Matthewman & Byrd, 2014). In the chapter, disruption is viewed in the context of modernity and 'splintering urbanism' as well as 'networked infrastructures' (Graham & Luke, 2010: Edwards, 2007). Analysing the disruption to electrical power caused by Storm Desmond in 2015, when Lancaster lost power, the sense of panic, constructions of knowledge and visibility of power that was present during the event had similar boundaries and nuances to those seen in 1974. Chapter Five presents this local-level case study, highlighting the individual voices that came to the fore during disruption. Firstly 'reconstruct' the event using data analysis, newspaper reports and social media posts. It will then interrogate how the boundaries of power demonstrate how disruption created new boundaries and publics, considering how knowledge is situated within these new environments. Moving to a discussion of visibility (Trentmann, 2009; Knowles, 2016), the case study builds on the idea of

disruption illuminating problems that are not able to be seen every day to demonstrate the need for change. The removal of technologies during the event is one of the key aspects that participants have drawn on to understand disruption and the knowledge owned, acquired and shared in the process. The final section will assess understanding of the event in relation to modernity and the disembodiment people felt because electricity was seemingly 'invisible'.

Maintenance emerges as a key theme throughout these two empirical case studies. As such, **Chapter Six** uses the concept of maintenance (Hall and Smith, 2013; Graham and Thrift, 2009) as a lens by which to view the immediate futures that arose after the two previous moments of disruption. By considering how the events highlighted 'systemness' (Urry, 2016), this section will look at the ways in which the1974 energy crisis was used as a catalyst for maintenance and how Lancaster 2015 was remembered a year later. Central to this section are the connections between past and present, with the chapter addressing notions of change and how long it took for change to happen from a historical perspective. This will lead to a discussion of ideas of maintenance, conflicting with the idea that the future is solely about innovation (Edgerton, 2010; Russell and Vinsel, 2016).

Chapter Seven takes the previous two case studies as building blocks and as an archive for a future scenario, a blackout in Lancaster in 2056. In conjunction with a future scenario workshop a possible future is explored. By investigating different futures thinking in relation to a blackout in 2056, the chapter highlights how attention to situated detail in one small-scale scenario can help us unpack a world of complex and sometimes global scenarios. Using futuring techniques such as backcasting,design fiction (Porritt, 2013; Coulton, 2015) as well as scenario planning, the approach to 2056 considers the policies and events that took place prior to infrastructure disruption becoming commonplace and widespread. This is intended not as a handbook for 'worst case scenario' but rather an exploration of how ordinary people understand prolonged 'pauses' to the everyday. The chapter also details in length the issues encountered when engaging publics with the future and the friction that arises during this engagement.

The **Conclusion** will revisit each chapter and provide a summary of the arguments. Limitations and problems encountered in the research will then alongside potential avenues for future research discussed. The conclusion ends by emphasising the original academic contribution made by this research and suggesting a possible 'toolkit for Social Futures literacy'.

This thesis provides an opportunity to develop design and futures research on complexity. This thesis can be considered as 'a fluid and complex network rather than acting as knowledge solution agents' (Arnold, 2016: 156), there is not a set pathway to take. Through the construction of knowledge in a post-disciplinary approach, complex uncertainties that are unable to be 'solved' are able to be addressed in a thesis through the action of infrastructuring and the work of maintenance undertaken by publics. This thesis has multiple pathways and levels, it could be read in different ways – for example, the case studies could be read separately as how to undertake empirical research on blackouts. However, the biggest 'take away' is perhaps the methodological approach taken. The next chapter begins this methodological journey to a new Social Futures toolkit.

2. Social Futures: The need for new practices and literacies

2.1 Post-disciplinarity: Between Design and Futures

This chapter addresses the challenge of undertaking research that deals directly with complexity. It seeks to highlight the implications of such research by using infrastructuring to address the nature of futures literacy and practices. It does so by showing the importance of not flattening complexity. Disruption is messy, it is layered and should be examined in detail. Theories from many varied disciplines and fields inform a deep understanding of the dynamics of complexity. Within futures literacy, the need to give meaning to 'discontinuity' (Miller, 2015), the ways in which a break presents an interruption of an on-going situation, is in tandem with the emergence of complexity. When discontinuities occur in society and governance, the changes tend to be more significant because they can alter so many other domains (Saritas, Smith, 2011: 297), adding to the complexity within the quotidian that individuals try to know, understand and use. The question of 'why do we use the future?' here has another layer, 'how do we approach complexity?'. Events can display both continuity and discontinuity. How everyday people understand that complexity and how they use the futures they engage with is central in approaching to the future.

Discontinuity allows us to find trends within these moments of disruption. Although the future does not exist in the present, which may suggest it cannot be used, the ways in in which 'knowing' the future and how the future becomes visible in moments of disruption are vital in shaping change. These moments of visibility are the moments of continuity that highlight how the future

exists in the present for a moment, and how it is used in action. These moments in turn demonstrate the need for new futures practices that involve publics as 'future-makers'.

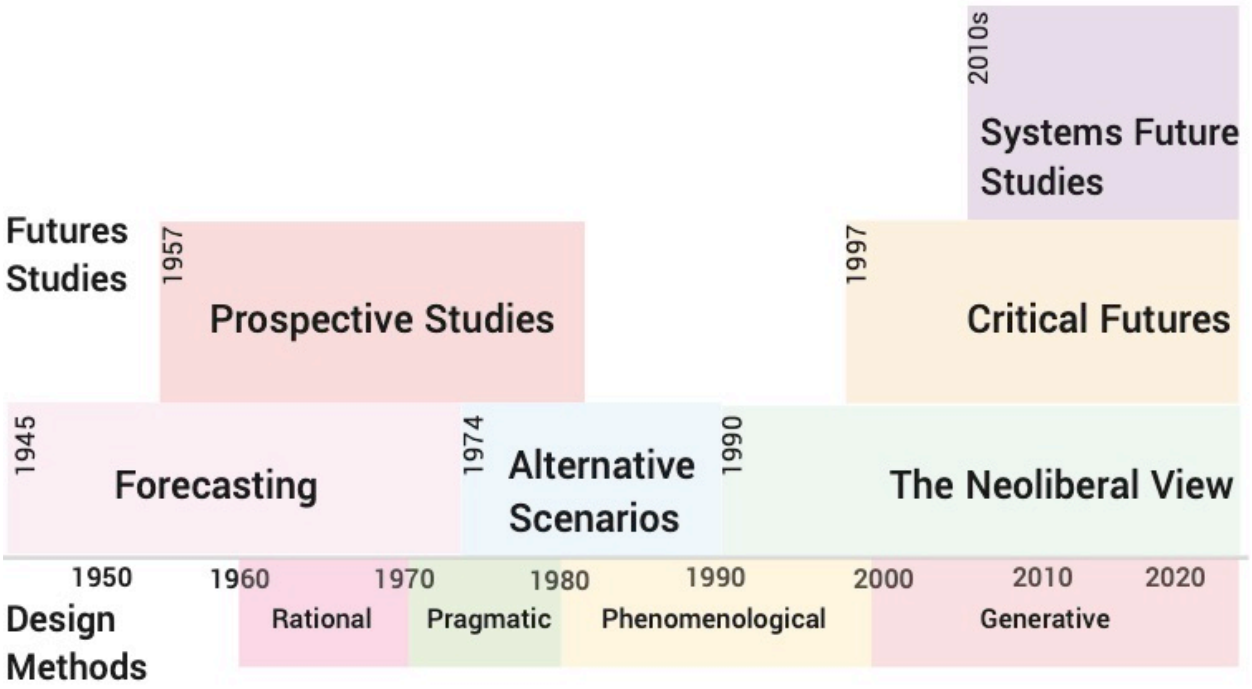

Figure 4: Development of Design Methods and Futures

Figure 4 presents the timeline of Futures Studies first seen in Chapter One (Figure 2) and adding to it the development of design methods. The shift in Futures as an academic discipline has parallels with the four generations of design methods. They are orientated as such: **Rational**- from craft to standardised methods. **Pragmatic** - methods customised to contexts. **Phenomenological** - Design Research and the involvement of stakeholders. **Generative** - Empathic and transdisciplinary (Jones 2014).

As highlighted by Bousbaci (2008) each of these paradigmatic shifts in design theory followed the systems theory principles in force during those times. This section focuses on the fourth generation, generative design, as it is this methodological perspective that has been developed to deal directly with complexity (Sanders 2008). Participatory Design, Co-Design, Service Design, Social Design – these disciplines of practical reasoning and argumentation, directed by individual

designers is the major thematic variation. Design is communication, construction, strategic planning, or systemic integration (Buchanan, 1992: 19-20) These approaches aid unpacking complexity, by highlighting the new knowledge bases are needed to address modern issues, a focus on the individual and their role in design practices. The rate of technological change, combined with the end of a 'business as usual approach'- events such as 9/11, Bird Flu and Climate Change have seen life in the 21st Century to be viewed as riskier, more uncertain and harder to understand than previous generations. The connections between world events and local, everyday life problematise the basic assumptions about the everyday and the future. Both design and futures studies question the present, pushing and looking into a new way of living. Publics have come to the forefront through the narratives that involve them as a key factor in the development of disruption. For example, the idea that switching from single-use plastics to sustainable materials will have a major impact on climate change, when in reality a whole scale systems shift is needed. Yet, the adoption of new practices and designs aids the future and creates greater awareness, less ignorance and better literacy.

This thesis involves three moments of power disruption that follow a temporal narrative of past, present and future within a framework that brings together multiple disciplines. The only way to fully address the complexity of such moments is to adopt this epistemological approach. By bringing design and futures studies together, an approach to complexity arises that does not 'flatten' the concept to be about one particular event (in the case of this thesis, the electrical blackouts that are used as case studies). Extending the vision of research beyond one disciplinary approach that is separate and not 'in conversation' with another creates a platform for understanding the entanglement of the present with both the past and the future. The methodological issues of studying complex systems can be linked to the ways in which disciplinary knowledge is approached. This chapter will address the ways in which disciplinary research is performed and the need to focus on action rather than disciplinary boundaries. It will then acknowledge the current practices of futures exploration. The world is increasingly post-disciplinary (Coles et al., 2005: 38) and in order to produce temporally relevant knowledges, an approach should be taken which focuses on not only lived experience but also uses them to

create new pathways to the future. Systems that were designed for one scale of operation are now required to support vastly larger scales of demand. Returning to pre-disciplinary roots of experiential learning (Mayer, Harrison et al 2007), post-disciplinarity fosters study and intervention as a holistic endeavour that considers how to support systems. Through the participatory futuring that takes centre stage in this thesis, integrating other disciplines' knowledge and skills, sophisticated interferences and synergies enables groups of people to grasp the interconnectedness of factors that are produced.

Understanding modes of research is key to presenting a post-disciplinary study. Set disciplines provide management of such new knowledge and separate what needs to be understood – for example a response to a specific question based on existing disciplinary literature and studies. Disciplinary work focuses exclusively on identified themes from set categories, other aspects of the topic being studied are not considered within this framework as often it is narrow and lacks breadth (Murphy and Jacobs 2013; 5). Although an important ontological approach, work in this mode does not reflexively consider the constructed nature of disciplines, themes can be viewed as ''artificial 'holding patterns' of inquiry" (Fuller, 2003: 1), where a set of defined questions can 'cloud' knowledge production (Coles et al., 2005: 33), and represent 'an evolutionary cul-de-sac in [their] development' (Sayer, 2001: 90) of research.

Building on the strength of disciplinary work, multi-disciplinary research focuses on intersections, combining approaches from two or more disciplines in order to understand topics in a more complex way, however each discipline makes a separate contribution (National Academies, 2005: 27). There is no integration of disciplines, rather insights and research remain within each discipline's methodological boundaries. In contrast the interdisciplinary space is where integration of multiple disciplines occurs. Incorporating multiple disciplines 'depends on finding ways to work collaboratively' (López et al., 2017: 533), suggesting that interdisciplinary research is undertaken by more than one individual, with each participant already situated within a particular discipline. The future is inherently interdisciplinary, futures studies tends to sit at the intersection of several academic categories. However, throughout futures studies there is

fragmentation (Bell 1997, Kuosa 2011, Son 2015). Dator (2008) noted that within the discipline, there is a lack of knowledge of previous futures work. A key issue of the topic as an academic field of enquiry is the disparate methods that are employed by researchers. This is where design can aid the study of the future. Design embeds futures thinking into processes, into objects, systems and services to be used in the present. Margolin positions designers as frequenting the dialectical space between present and future (2007). Futures are unknowable and design happens in use (Ehn, 2008), design research has to become participatory, experimental and iterative when it is to consider future temporalities. Design is not an isolated concept, designing an object or system has a knock-on effect, with responsibilities placed at all points of the network and although boundaries can be useful, engaging with complexity through electrical blackouts requires a way of understanding it as a site for design.

A similar approach to interdisciplinary research, trans-disciplinarity is concerned with understanding the present world but integrating views based on an overarching theory (Repko, 2012: 21). Trans-disciplinary research fosters 'new theoretical frameworks' for understanding social, economic, political, environmental, and institutional factors (Klein, 2003: 24) encourages a way of working with complexity, rather than trying to divide it into the studies of various disciplines. Generating an overall knowledge which embraces all disciplines, transdisciplinary research creates unity. Figure 5 illustrates the different types of research. Unlike these various modes of research, post-disciplinarity fosters study and intervention as a deliberate (although uncertain) path to new research. It enables analysis and design to follow connections all the way through and to forge viable new connections, because they are more mindful of the multitude of dependencies.

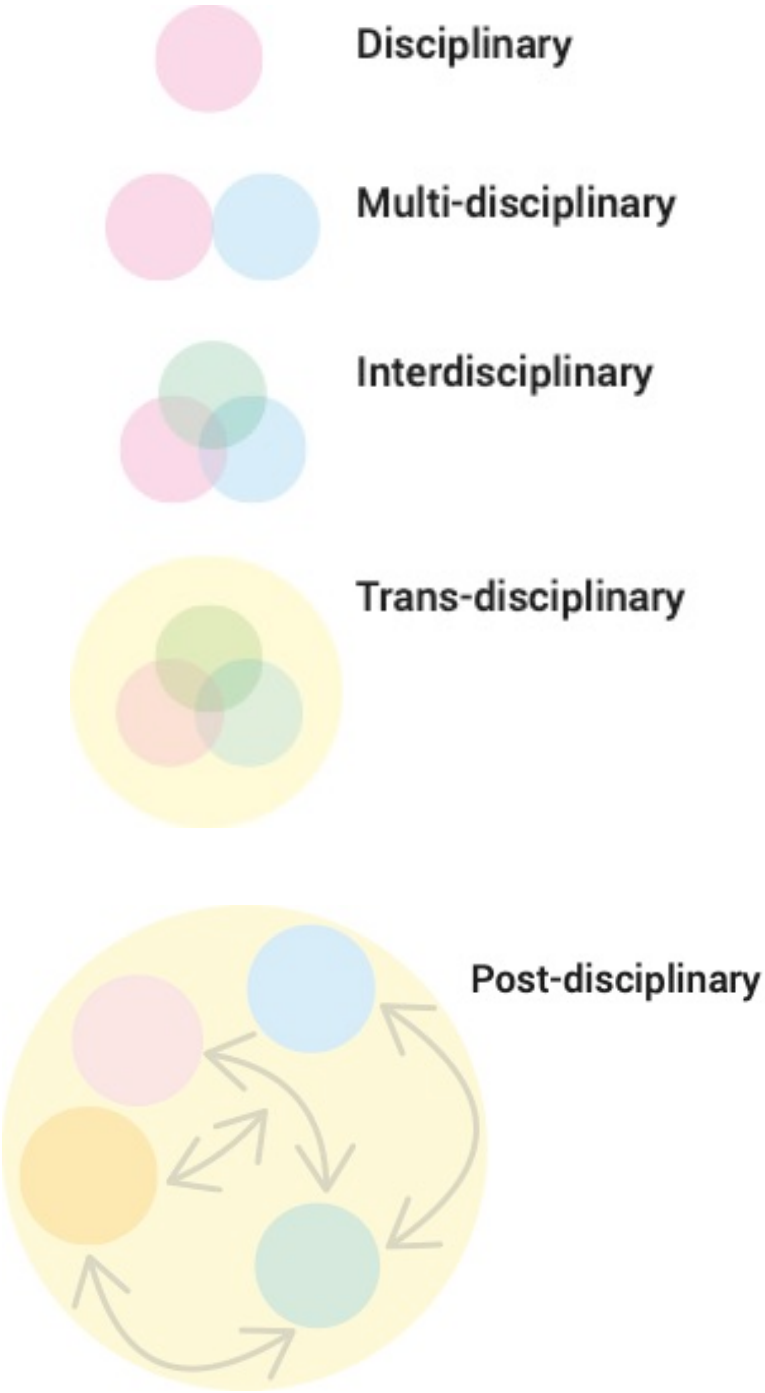

Figure 5: Modes of Research

Complexity's non-linear relationships, interactive causality and emergent properties of systems compels researchers to adopt a transdisciplinary perspective. However, again this ignores the need for practice to be embedded within theory. Post-disciplinarity builds upon trans-disciplinary

ideas and shifts theory to action. One of the key issues within any work that incorporates multiple perspectives is the interpretation of work by others both in and outside the field of study. This stems from the difficulties in translating assumptions from various disciplines into the work. Interdisciplinary research requires not only different approaches to knowledge, but additionally an understanding of how to work together. Developing research beyond disciplinary epistemological structures that direct research is not a simple task; Smith (1998: 311) notes that post-disciplinarity requires creative and flexible approaches to investigating, more so than the interdisciplinary as it further strips away disciplinary outlooks. This does not mean stripping everything away in an anti-disciplinary manner; instead it acknowledges benefits to a disciplinary approach.

Post-disciplinary research structures supplement the work derived from interdisciplinary studies by creating new circuits, free of methodological constraints. Chapter Three will explore the ways in which methodological constraints present friction points by which to create new ways of learning, and in the case of this thesis, futures literacy. Moving to a post-disciplinary approach enables the interconnectedness of factors and domains influencing socio-technical innovation to be further understood. Forgetting about disciplines and whether ideas can be associated with any particular one with ideas pursued to their logical conclusion rather than the limits set by a discipline (Toulmin, 2001). A post-disciplinary study allows debates to be driven forward to understand the relationship between power and change, experienced in their multiple forms.

The temporal dynamics of post-disciplinary study are vital to this thesis, as the case studies demonstrate what happened and why, but are also used as a lens to view shifts in infrastructuring. The issues addressed in this thesis are not situated within one disciplinary classification; they draw on and develop concepts and methodologies suited to the themes throughout with no regard to specific disciplinary proprieties. They develop new concepts not rooted in any discipline. Throughout the thesis, the limits of the ‘inherited disciplines’ (Sum and Jessop, 2003: 23) are critically acknowledged; ‘the post-disciplinary approach is also critically self-aware of both the epistemic and ontological limits of inherited disciplines and is explicitly

problem-oriented rather than tied to disciplinary blinkers' (2003: 6). In this study, the method is in the making, no set disciplinary framework has been adopted to understand the phenomenon.

This post-disciplinary approach is a key tool in approaching complexity. In *What is the Future* (2016) Urry uses the phrase 'wicked problems' (Rittel and Webber, 1973) throughout his exploration of the concept of the future, and views the concept as central to addressing the future and 'unknown unknowns'. Wicked problems theory, as the next section shall detail highlights that although difficulty of addressing numerous challenges that face publics can be viewed as wicked when 'there are multiple 'causes' and 'solutions' and the effort to solve one problem reveals or creates other problems' (2016: 76), the theory is not appropriate for unpacking publics approach to complexity and their modes of infrastructuring. Nor does it aid futures literacy. There are 'known unknowns' within complexity that need to be embraced (Snowden and Boone 2007).

2.2 What's wrong with Wickedness?

Many a PhD thesis that focuses on an element of design within systems, design thinking and design management will acknowledge the concept of wickedness. Central to the second 'pragmatic' generation of design methods, the concept was first employed by Rittel and Webber in 1973 through their theory used to refer to problems that are difficult to define and solve, it has been since adapted, critiqued and become a key theory in addressing complexity (Buchanan 1997, Rayner 2006). This section unpacks why wickedness is often used in design thinking and why this thesis will not use it to approach complexity, the theory may predict the inevitability of unforeseen consequences of design decisions. However, as a concept it is too systemic, not relating to practice theory and action. Instead, this section shall demonstrate why using inventive methods (Lury and Wakeford 2012) to address complexity is not only a more useful approach, connecting the job of the researcher and the social world, but a way that allows for new ways of thinking about complexity, when the future is mobilised to deal with these messy issues.

In order to critique the concept, it is appropriate to unpack the concept. Rittel and Webber (1973) originally defined the term through the following ten characteristics:

(1) **Wicked problems are difficult to define. There is no definite formulation.** A problem can be framed in many different ways, depending on the aspects that one has chosen to emphasise. For example, with the wicked problem of power, one solution may be greater devolution from government, whereas another may involve greater State intervention. The first reduces the amount of central governance, the second attempts to increase it.

(2) **Wicked problems have no stopping rule.** Understanding of the problem depends on how it is approached. The problem is never truly solved as each new insight improves understanding yet it is never completely understood.

(3) **Solutions to wicked problems are not true or false, but better or worse.** Judgements on the effectiveness of solutions differ wildly based on the interests, ideologies and values of individuals who are participating in the wicked problem.

(4) **There is no immediate or ultimate test for solutions.** Any solution will generate consequences that may in turn cause repercussions that outweigh the intended advantages.

(5) **All attempts to solutions have effects that may not be reversible or forgettable.** There is not a way to learn through trial-and-error, every attempt counts. For example, you cannot build a nuclear power station just to see if it will meet energy requirements without it having an impact on the economy, environment and various publics.

(6) **These problems have no clear solution, and perhaps not even a set of possible solutions.** There are no criteria that allow us to see if all possible solutions have been identified and considered.

(7) Every wicked problem is essentially unique. Something that worked elsewhere will not work for wicked problems, as a particular wicked situation will have unique features. This calls into question the common organisational practice of implementing best practice that has worked elsewhere.

(8) Every wicked problem may be a symptom of another problem. A wicked problem can usually be traced back to a deeper underlying issue. It is difficult highlight whether the fundamental underlying problem has been identified.

(9) There are multiple explanations for the wicked problem. The choice of explanation determines the nature of the resolution, with each explanation serving the interests of a particular group of stakeholders.

(10) The planner (policy-maker) has no right to be wrong. Those who work with wicked problems (infrastructure planners, for example) are paid to design solutions, held responsible for any consequences of their actions.

Infrastructuring is a politically charged notion, in many ways taking Rittel and Webber's framework to demonstrate complexity could be useful – the concept applies when there is a lack of definitive formulation and no one clear definition. There is no idea as to when a solution for one issue has been found, for example when trying to 'solve' the issue of creating a continuous supply of power, there are only 'good' and 'bad' outcomes with no immediate and ultimate tests of solutions. Those who have knowledge often disagree about the reasons for the problem; let alone how to solve these. However, 'clumsy solutions' (Rayner, 2006) demonstrate how previous policy solutions have failed; uncertainty which leads to opportunities for social innovation. The long-standing activism that seeks to take on collective issues in relation to climate change and consumption has accelerated in systems where multiple issues exist. This form of action creates a new part of the network that does not serve to provide solutions, but rather alternatives. It is

only in recent years that the environment has been viewed as 'wicked' (Head 2008). The case studies that follow present a way of approaching these difficult, knotted issues through public action.

Figure 1 mapped aspects of the complexity, through the electrical blackout as an event. Almost any problem that is difficult has become to be regarded as 'wicked' in academic literature (Peters 2017). Rittel and Webber fail to acknowledge that such issues involve multiple actors and are socially and politically complex. Figure 6 for example, highlights the connections of some of the major stakeholders in Lancaster during the blackout that is discussed in Chapter 5. The formulators of the concept did not list this as a separate dimension but the political difficulties of making decisions in a more participatory environment highlight the layers of complexity.

What does 'wicked problem' mean to those experiencing an event, in this case the disruption of an electrical blackout? Not much. In the moments where the present becomes an experiment in living in a 'future', publics seek to work with the issues at play and create new ways of getting by. If I had walked around Lancaster days after the blackout in 2015, asking residents if they considered the confusion around responsibility, connections to a wider issue (in this case climate change) and their role in the disruption as a 'wicked problem', I would have probably been met with stern words. Those who experience these issues first hand, regardless of their role or status within the network, seek a greater understanding of what is going on. This can only come through action. Peters considers the overuse of the term in policy as an approach that demonstrates 'abuse' of the concept as the issues at play do not meet all the requirements (2017: 386). Wicked problems may demonstrate the lack of integration of different levels, and the need for a greater understanding of these. However internal dynamics that are not assumed to be linear need to be explored and highlighted.

As an analytical distinction, the term presents a way of viewing issues without having to address problems directly. The label itself has political aims (Termeer and Dewulf, 2019: 19) and in turn trying to solve the 'wicked problems' deceives citizens of the bigger picture and undermines attempts to enter into a deep, mutual understanding of the untamed aspects of the problem.

The issues considered in this thesis are far from static (Arnold, 2016: 156), solutions depend on how each issue is framed and vice-versa; different stakeholders have radically different frames for understanding the problem and its solutions. Snowden and Boone (2007) state that this can lead to 'analysis paralysis', where a group of experts hits a stalemate, unable to agree on any answers because of each individual's entrained thinking—or ego. The constraints that the problem is subject to and the resources needed to solve it change over time. The case studies demonstrate there are negative consequences for society if complexities are not addressed. It is not about solving the current issues, but finding new ways to work through the problem to create better futures that are understood by many.

While the concept of wicked problems itself contains a number of characteristics that produce significant challenges for decision-making, this has been upped recently with the concept of 'super wicked problems' (Levin, Cashore, & Auld, 2012; see also Lazarus, 2009). This concept is meant to capture the nature of significant policy problems facing contemporary governments and advance the notion of 'transboundary wickedness' (Noordegraaf, Douglas, Bos, & Klem, 2017). As with the concept of wicked problems, super-wicked problems have a number of defining characteristics, in addition to those used to define wicked problems.

These characteristics are:

(1) Time is running out. At some point global environmental problems such as climate change will be too acute, have had too much impact and be too late to reverse.

(2) There is no central authority, or only a weak central authority, to manage the problem. There is no coordinated global system of governance that has proven effective in addressing global environmental problems like climate change.

(3) The same actors causing the problem seem to solve it. Every person trying to reduce climate change has contributed to climate change. In the case of this thesis, it can be said

that the impact of power cuts has been caused by the use of electricity becoming vitally embedded in everyday life.

(4) The future is discounted radically so that contemporary solutions become less valuable. Short time horizons are used within policymaking that deals with super-wicked problems as there is a focus on definite present consumption as opposed to future gain.

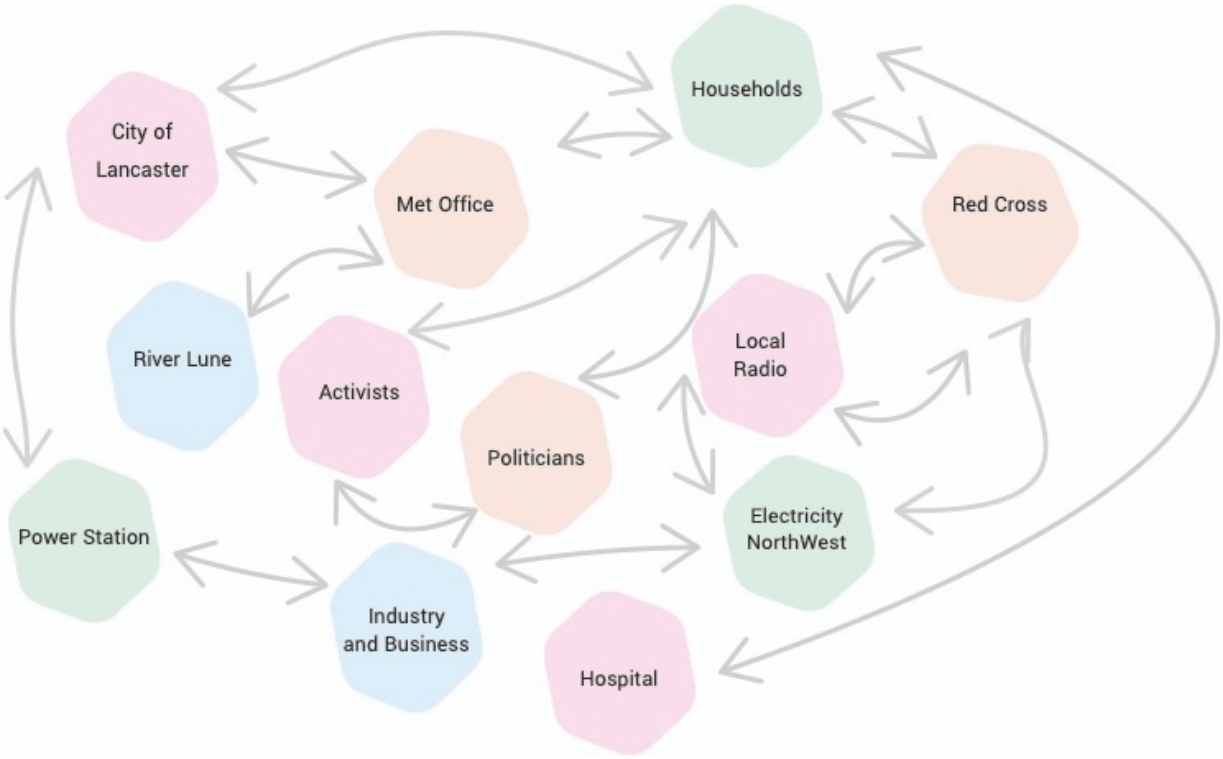

Figure 6: Key actors during the 2015 Lancaster Blackout

Bunders, Bunders and Zweekhorst indeed maintain that climate change is an example of a super-wicked problem (2015: 22-3). A recent example of an attempt to solve this is the Paris Climate agreement (COP24), with the setting of goals an attempt not to directly lead to the solving of the wicked problem. Rather, they are elements to hold to account throughout the new planning actions that are instigated. In addition to the institutional characteristics involved in this definition, the element of time becomes more important than in the original conception of wicked problems. This time element is most evident with climate change for which there are a number of clear and compelling predictions of irreversible harm if there are no significant policy interventions. For example, the gap in targets and actions of the Paris Agreement on Climate Change, such as how global CO_2 emissions from energy and industry have remained stable since 2014 yet greenhouse gas emissions continue to slowly rise (EGR 2017: xv) illustrates the conflicting temporalities of the past, presents and futures.

To consider electrical blackouts as a wicked or super-wicked problem does not aid new ways of viewing the future, and learning from the present. Although the term can reveal 'leverage points for intervention' (Meadows, 2004), that have the potential to create exponential change and strategically link existing projects for greater leverage and reveal opportunities for new ones. The term does not focus on action and incorporate practice theory. It does not contribute to dealing directly with issues enough. What is needed are people-focused perspectives that are small, localised images of the 'problems in situ' as without these the ways in which the future will be 'known' will only serve those who create it, for their own means. By the time problems of any social consequence (e.g. deciding a public health policy or instigating a more democratic society) are identified, conjectured, and defined they are already 'solved' according to the frame of the professional, politician or activist. Problem framing is a contingent, fraught, and contested process for which there is no authoritative set of rules, criteria, or methods.

To define social and political problems in terms of the need for better communication amongst citizens (i.e. social networking) already presupposes a solution, thus short-circuiting challenging debate. In so doing it attempts to tame a wicked problem, attempting to do so serves only the

group trying to solve the problem. This can be seen with both the vignettes of Puerto Rico and Las Vegas (1.3) as well as the text messages I received during Storm Desmond. During Storm Desmond, individuals were reliant on decisions made by authoritative bodies during the initial moments of disruption. This demonstrates again the complexity of power, as when governance occurs, it does not solve a problem for everyone; instead the problem is masked by solutions that do not require a great change.

Governments may have to admit that many of the issues which they must address may not be solvable in any final and definitive manner (Carter, 2012; Hogwood & Peters, 1984). Within this framework, solutions are solutionist (Morozov, 2013) better responses are required. The wicked problem is poorly explained in terms of goal setting, constraints and rules through a well-defined problem space. Not all hard-to-solve problems are wicked, only those with an indeterminate scope and scale. So most *social* problems—such as inequality, political instability, death, disease, or famine—can be considered wicked. They cannot be 'fixed'. Because of the role of design in developing infrastructure, designers can play a central role in mitigating the negative consequences of complexity and positioning the broad trajectory of culture in new and more desirable directions. By taking the 'illuminated' space of infrastructuring to be the disruption of an electrical blackout, systems that are previously hidden become visible and those that are usually apparent without breakdown are hidden. Problems that could be considered 'wicked; need an incorporation of learning from past and presents using real world trial and error. In this thesis moments of disruption serve as 'systemic innovation labs' (Zivkovic, 2018), we will take these moments and consider how they work together. Bringing past, present and future together highlights how action spans timelines and generations of publics. Combining design research with futures studies allows a way of 'making sense' of complexity that presents clear ways of building upon action.

In order to understand complexity and move away from the wicked problems narrative, place is important – small, local studies can illuminate new methodological tools for dealing with complexity (See Chapter 6). Within this study, the location of the case studies has been identified

by the lack of power that existed within them – the places that experienced the short-term disruption. The first, a focus on 1974 takes a country wide overview; the second a localised example of a blackout, Lancaster, a city in the north west of England in 2015. The futures explored later in the thesis use Lancaster as the focus. As a location, Lancaster is a prime position to undertake this study, bringing the complexities of disruption into focus in a place which has not previously witnessed a prolonged, catastrophic moment of crisis and breakdown. Previously studies of power failure have focused on a marked dichotomy, areas which are dependent on an external supply of electricity, for example New York, or countries that are without constant supply network (e.g. McDonald's 2010 work on Nigeria). Through this lens there has been no study of the banal, and somewhat unknown places that often experience short-lived disruption – yet within these sites' communities are mobilised into creating change. This happens when a breakdown occurs.

2.3 Design and Inventive Methods

Within Design Studies, the use of the wicked problem shifted design theory away from the material to 'design thinking' (Kimbell, 2013), a vision of design that tackles big issues and considers the creative strategies that highlight the importance of instinct and experimentation over empirical evidence in the shaping of structures and relationships. Buchanan (1992) began this shift by taking Rittel and Webber's (1973) approach away from its focus on industrial design, arguing design thinking can be applied to systems that are both visible (tangible) and invisible (intangible). Seeking to define the role of design in the world, the 'fourth order' (2001: 11) sees design move beyond systems and objects to an exploration of interactions and environments. Manzini's concept of dematerialisation' (1998), echoes this idea – that material goods can be supported or substituted by immaterial systems. Within this thesis materiality and visibility are vital to understanding how infrastructuring practices based on action occur. The role of materiality in presenting the temporal nature of infrastructure are evident in the case studies of 1974 and 2015. However, as the last section demonstrated, as much as design has embraced 'wicked problems', in order to create better futures literacy, and in turn better futures, action and practice is needed.

Acknowledging the preoccupation of how things do (or do not work), the merging of design thinking, the idea that designer's approaches and methods can be applied to other situations, such as management, sociology, and politics, has been considered a failure to understand the intellectual culture of design practice 'we must avoid swamping our design research with different cultures' (Cross, 2001: 55). Historians entrenched within their disciplinary boundaries view design thinking as a 'commodity making syphilis' (Vinsel, 2017) as it fails to acknowledge the lack of innovation embedded within products and services that are presented as ground-breaking and new. However, design's unique perspective of approaching things which are not yet material or known, has become an approach in understanding how to tackle such issues. Complexity is flexible and expanding in its meanings and connections. Urry's work on carbon systems builds on the notion of structural causation and path-dependency, viewing this as not only as determining everyday empirical experience, but additionally as a driver of social change (Urry 2009). Whilst opening up the social relations of the future, there is a need to highlight action as a way to create new futures pathways. This section demonstrates how design research methodologies can aid this new methodological approach, by presenting a foundation

Design is highly involved in the development of everyday life, when approaching complexity in a 'complex world' (Thackara, 2006), the role of design is vital. The perspective of design as a practical problem-solving epistemology (Cross, 1990) as well as systems thinking as a design process (Ackoff, 1993) can aid an understanding of design's role in shaping futures. Design considers the 'use of different disciplines and the best relationship with end-users' (Julier, 2014: 61). Dilnot (2015) suggests that design simultaneously states 'this!' and *asks* 'this?' it is able to render visible and tangible imagined situations. Design research is vital when looking at futures research and exploring a post-disciplinary methodology. In design there has been a shift from a focus on giving form to objects, instead using purposeful action to solve problems. Social design focuses on 'generating and realising new ways to make change happen towards collective and social ends, rather than predominantly commercial objectives' (Armstrong, Bailey, Julier, Kimbell, 2014).

Design thinking highlights the need for new integrative disciplines by combining theory and practice for new productive purposes. This is utilised throughout this text, allowing experimental thinking and a way of creating other types of 'product', in this case an understanding of the future. Kimbell has noted that the relationship of the material to social actors has often been ignored in discussions of wicked problems and design thinking (2012: 146). By considering the complexity of an event, the material parts are put in direct conversation with the publics who interact with them. In this work, those who act can be viewed as 'designers' finding methods and ways of creating, adapting, and changing their futures and their power relationships. Infrastructure both supports and constrains design action (Lukens, 2013: 1). Infrastructures and their publics affect the scope of design action, they separate what might be considered reasonable – for example, adding something new to home – from something that might not be considered at all - redesigning the electrical grid.

Using moments of disruption and an emphasis on achieving new knowledge regarding the nature of practice and how to improve it, rather than creating and reflecting on new artefacts enables the case studies to be viewed as spaces to explore the connections between actors and address complexity. Design research that is practice-led advances knowledge (in this thesis, the response to blackouts post-event) but also evolves practice (how people respond during the event). Design thinking highlights the need for new integrative disciplines by combining theory and practice for new productive purposes (Laurel, 2003). Infrastructuring and creating socio-technical resources that intentionally enable adoption and appropriation beyond the initial scope of the design is a process that might include participants not present during the initial design. Design research allows for an experimental way of thinking, creating other types of 'product' (Ireland, 2003). Viewing the blackout as a design culture in this way facilitates an exploration of better connections, consequences and how to better deal with complexity.

The materiality of infrastructure can be approached as a process: fluid, continuous and relational, which is created and experienced in historically situated networks where people, things and society interact (Damsholt & Simonsen, 2017). Studying infrastructure and the publics formed

within it allows interactions to be explored creating something not yet in existence; the future. Power is exerted over energy consumption, yet nothing happens until the intent of others comes into play. This is evidenced by the way in which climate change rhetoric is embedded in daily life, having only become common knowledge through top-down dissemination by experts in the field imparting their advice to the public.

Infrastructure failure can be viewed as a moment of disruption with a 'design culture', when interrelationships between design artefacts, in all their manifestations, the work of designers, design production (including marketing, advertising and distribution) and their consumption are visible (Julier, 2013). The blackout, the point at which material, spatial, visual and social things that have been configured to work in certain actor's interests breaks down, highlights the interactions (or lack of) between the economy, the systems of production and the everyday worlds of consumption. In trying to locate a pathway to better understanding the connections and relationships at play within energy distribution, Bennett's work on the electricity grid builds upon the actor-network perspective of Latour, discussing the North-eastern United States blackout that affected Boston, New York and the Great Lake areas in August 2003. For Bennett, electricity is deserving of its recognition as an assemblage with many 'strivings' and parts, from the actants within (2009: 27). Emphasising again the multiplicity of power, when looking to solve one issue another is created in its place. Within a framework of agency and power actants in the assembled network have their own beliefs, actions and modes of change. For Bennett, the existence of the power grid is the intimation of its collapse (2009: 27), if all the 'strivings' of electricity wish to have their say, then the system is prone to disruption again because not one solution will suit all. However, Bennett compounds ignorance by absolving power companies of the capacity to act, as highlighted in both case studies of 1974 and 2015, this is not the case. Instead, actions of those who manage the grid are viewed as not being the right solution.

In order to dispense with the academic and authoritative monopoly on the future and the 'solutions' that are required, inventive methods aid post-disciplinarity. Design is no longer a 'studio practice', and whilst engaging stakeholders in the many different activities of designing.

Metcalf (2010) states that in practice social systems are not approached with a set of design methods or a toolkit (such as IDEO's Human-Centered Design)[12]. Often solutions presented through these approaches are not repeatable, nor are they fully accessible. The future is not one size fits all. However, we *can* begin to develop a toolkit for methods by using design research in creative ways to better design pathways to the future. Methods are inventive and useful if they 'can be deployed to 'lure' materials into *posing their own problems*'. (Lury, 2012: 21). Understanding problems, again through increased futures literacy, aids dealing with complexity. The acknowledgment that complexity is defined by the stakeholders within a social system is a vital part of this toolkit. In order to develop any new ways of seeing, the methods and strategies adopted must be accepted and understood by these stakeholders. An approach involving inventive methods allows for these stakeholders to play a key part in the design and creation of such methodologies.

Snowden and Boone (2007) present tools for managing, decision making and leading in complex contexts. These can be used as a way of thinking about how to conduct a post-disciplinary study of the future and a start to a 'Social Futures' research toolkit, highlighting what needs to be incorporated.

- **Open up discussion.** Interactive communication is vital within complex contexts. Focussing on disruption and the places it occurs requires an understanding of the democratic, interactive and multidirectional discussion that occurs in these spaces. Incorporating the political into both the case studies of Chapters Four and Five allows us to see how an this combined with the infrastructuring practises happening on the ground provide the best clues on how to address complexity.

- **Set barriers.** What barriers are set during the events? How do publics not only have barriers placed upon themselves (in the case of 1974, the 'three-day week' electricity restrictions) but how do they police themselves to deal with disruption?

[12] https://www.ideo.com/post/design-kit

- **Stimulate attractors.** Within this thesis, the probe is the disruption caused by electrical blackouts. There is a need to utilise these probes after the event.

- **Encourage dissent and diversity.** Incorporating the resistance that occurs in these complex settings allows for parallel narratives to work with each other (or not)

- **Manage starting conditions and monitor for emergence.** Focusing on creating an environment from which good things can occur, rather than trying to focus on predetermined results (much like economic forecasts).

The success of these tools is dependent on the users being able to understand and use them, during disruptive events publics become their own decision makers. The methods employed within Social Futures research not only have to highlight *what* happens in these moments, but *how* and *why* they create futures. By considering how people are 'making futures' and by engaging 'people in investigating futures and future making processes who are rarely involved in these processes, this thesis uses the future as device by which to act upon during and after disruption. Yet, such activities make futures in a very significant way, shaping the quotidian day-to-day of future publics. They currently are only beginning to have a difference in futures thinking. Instead, publics just cumulatively 'act'. In chapters Four and Five the case studies of 1974 of 2015 present examples of how people actively make futures in relation to disruption and how they perceive their role in changing aspects of their worlds.

Inventive methods do not rule out the 'multiplicities of purpose' (Marres 2012) and the term does not automatically equate to new methods, as Chapter 3 and Chapter 7 demonstrate methods such as case studies have a long history, whereas other, such as 'the event as an experiment in participation' are in the making during the moment (Suchman 2012: 48). They are however united by a need for them to be engaged with in practice, Chapter 7 demonstrates how to bring these methods together. Employing methods in this way displaces and pushes, as design does, to apply a method to a specific problem in order for a new response to that problem to

emerge. They become a responsive tool that can be used for beginning to understand and work with complexity. This thesis is not a 'how-to' on conducting Social Futures, however it is the start of a conversation about what publics, researchers and governance needs to do in order to reflect on past, presents and move forward to the future together.

2.4 Social Futures

Shifting from looking *at* the future to looking *into* the future - moving away from the ideas of what we can and cannot know about futures, from anticipation to action - is one of the ways in which design can aid futures practices. It is a device that pushes our thinking. In the comprehensive reviews of the future presented earlier in section 1.2, predictions and visions of the future are categorised into strategic foresight practices, professional association activities as well as academic futures research. Devices of the future already exist, yet often they do not best serve the needs of publics when dealing with complexity. This section will detail examples of each, whilst demonstrating how an expansion of approaching why and how we use the future increases the ways in which we can see what may be done. In this way futures literacy integrates complexity into our understanding of the everyday.

Visions of the world are not value-neutral. There is no singular starting point, 'many of us are in very different ''places'' and with very different sets of futures' (Tonkinwise, 2014: 74). DiSalvo (2012) highlights that failing to connect to actual practices and contexts sees futures projects become spectacles 'to arrest us and pique our interest' (here DiSalvo is explicitly referring to speculative design projects). A narrow mind-set of what shapes the future fails to acknowledge alternative models of how our cultural, moral and even religious values might change (Prado and Olivera, 2015). Making sense of the future has been explored by many. Dominant industry methods and concepts used in future making – such as scenario planning, modelling and technology 'roadmaps'– methods that present images of the future that appear highly probable, are grounded in economic foresight and planning. This strengthens their sense of robustness; however, these forecasts often turn out to be wrong. Greater 'bottom-up' futures literacy and

an appreciation of Social Futures can add greater validity to scenarios, using what publics know alongside their infrastructuring practices brings us closer to better pathways to the futures. Social Futures as a mode of study can be used to highlight this temporal choreography of participation and how we can imagine futures that involve publics in a different way. Bringing together past, present and future as well as the global, local and national.

Learning to cope with complexity in the present is as important as thinking about solutions for the future. Understanding the issue requires an analysis of past and present cases where disruption has occurred, 'people must live in the here and now' (Nye, 2001: 100) in order to anticipate what is yet to come. These cases of disruption are proto-futures, spaces where hopeful practice emerges, as well as where dysfunctional dynamics become visible. Action exists within a political economy, yet the cultural political economy at play, the *meanings* of these acts have influenced social practices. Through repeated actions, performance and re-enactments these meanings become embodied (Julier, 2017: 3). Practice theory may view disruption as unnecessary in causing change to begin or take place and that every activity is a potential change (Schatzki, 2010), however, this study is not concerned with 'potentials' and what could happen, it focuses on action.

If futures are 'tame', models can be worked using previous data. In futures studies, forecasting seeks to anticipate the future on the basis of historical and current knowledge and trends (Schwartz, 2005). Helping decision makers use the best possible judgements, forecasting assumes that the world will remain one that we recognise. The basic assumption of such an approach is that the past is 'the prologue for the future' (Gray 1996). Historical trends are used in this thesis through the incorporation of past moments of disruption, however, these are not used to predict, or present an economic model. Stengers refers to the 'event' as being vital when addressing these issues,' every event brings the future that will inherit from it into communication with a past narrated differently' (2015: 39). Chapter Three presents why case studies of previous events are a method by which to study these networks, the strong impact of a contained temporal structure on how we imagine its development. This perception of time

enables publics to imagine that they can 'colonize the future' (Giddens, 1999), and through performing participatory practices engage in this further (Felt, 2016). Conceptualisation of the future is open to 'exploration, exploitation, calculation and control' (Adam and Groves, 2007: 2). Temporal ordering allows prioritisation, highlighting time scarcity and efficiency. Here, a substantial amount of the 'future making' appears to be local, preoccupied with the needs of one community and a particular set of publics. Action inscribes itself in within wider discourse. Projections and images of the future carry traces of places, people and perceptions of what will remain (tradition). These are used to construct futures and shape the politics of the future as the structures of governance that were in place impact on what is yet to come.

More useful here is the key concept of strategic foresight for thinking about how futures can be co-created. Foresight deals with the challenge of shaping the world into one we want to live in, embracing human capacity to think ahead, model, create and respond to future eventualities and possibilities (Slaughter 1995). Futures do not serve as predictions, but a way of understanding alternatives. Strategic Foresight is useful for studying complexity and how publics can become involved in future-making. It highlights how the macro issues in the environment are growing in importance and are in desperate need of new coping mechanisms. Ramirez and Wilkinson note how management systems need a redesign (as Snowden and Boone attest) in order to restore balance between complexity of context and the system (2018). Forecasting has presented too narrow an approach when dealing with turbulence, the internal factors of a forecast need to be balanced in the complexity web with those external needs that connect to a macro-view. Strategic foresight calls for engagement with a co-created future, collectively making sense of the future (Lustig 2017: 28) Ramirez calls for combining multiple futures methods, merging strategic planning with scenario planning – this is the Oxford Scenario Planning Approach (OSPA). Business approaches to the future can aid a study that involves publics infrastructuring to deal with complexity, as although providing visions that are self-serving, they incorporate how many stakeholders begin their futures.

Scenarios can help present visions of the world where there is no singular starting point, 'many of us are in very different ''places'' and with very different sets of futures' (Tonkinwise, 2014: 74). DiSalvo (2012) highlights that failing to connect to actual practices and contexts sees futures projects become spectacles 'to arrest us and pique our interest' (here DiSalvo is explicitly referring to speculative design projects). Processes of prefiguring only occur and only have effect in and through the trajectories or 'lives' of specific social practices (Shove 2013). A narrow mind-set of what shapes the future fails to acknowledge alternative models of how our cultural, moral and even religious values might change (Prado and Olivera, 2015). The OSPA intervenes in these mindsets by first determining the learners and the purpose of the intervention; then defining developing, verifying, and refining a set of contrasting strategic frames; then using these to reframe the current situation (upframing). (Ramirez and Wilkinson, 2016: 115). This reframing allows for further clarification and an expansion of the view being presented. Reframing a current situation occurs in the case studies of Chapters Four and Five, when the experiences of publics are incorporated into the narratives that have previously ignored lived experience.

Scenarios occur when there are conceptual knots to unpick, uncertainties and a lack of clarity with problematic societies. Their role in futuring is discussed further in Chapter 7. The future as well as future making practices are understood to be situated (Suchman et. al, 2008) and fixed in a certain space. Scenarios provide analysis, communication, education in design, possibilities and ways of thinking. Watts (2008: 196-197) states that different places - their temporality, topography, sociality, and sensory experience – may lead to very different everyday practices and therefore the creation of very different futures. Place interferes with how futures are imagined and made, rather than viewing global futures as universally the same, situated futures are located in landscapes and epistemologies around the globe. They are different, do not have to be fixed or linear and nor do they have to be predictable or expected. Scenarios enable us to play with these places, bringing unconventional and unpredictable ideas, visions and beliefs into spaces they do not currently exist. They consider different flows of time and different forms of systemic and cultural depth. In forecasting, the flow of time is linear: past to present to future. In scenario practices, by contrast, the flow is multi-directional (e.g. past and future into the

present) and iterative. The workshop held in Lancaster in May 2017 (Chapter 7.2.1) enabled public understandings of this relationship to be included in the future scenario that is presented (7.3).

In Chapter Six, the idea that change occurs after an event is addressed. This incorporates a discussion of ideas of maintenance (Hall and Smith, 2014, Thrift 2012) to move forward from the traditional methods of design thinking and innovation studies - that the future is solely about innovation (Edgerton, 2007; Russell & Vinsel, 2016). Chapter Seven, 'Blackout 2056' explores the methods behind the future presented in the chapter; presenting backcasting and scenarios (Porritt, 2013; Luebkeman, 2015) as a way of exploring a future experience. It will show the importance of using past and present together within these methods as well as incorporating community visions of their future into academic discourse, utilising the common community futures questions of 'What scenarios do we want? How do we want to work and live? As well as 'What futures do we want?' (Candy, 2010).

Government foresight practices utilise scenarios as a way of dealing with uncertainty. The UK Government's 'Futures Toolkit' sets out several tools for working with unknown futures, considering the impact of the future on pathways for policy.[13] The myriad of approaches to the future mean that this thesis could be dedicated to a review of these issues alone. Tools such as Roadmapping and Visioning. Roadmapping shows how a range of inputs, research and trends will combine over time in order to deepen understandings of connections. Visioning creates a set of common aims and objectives to describe what the future will be like if they are delivered. These tools are central to what are believed to be successful policy outcomes. Prioritising steps required to achieve certain futures is not the aim of this thesis, although they may mobilise the questions of 'what futures do we want', the organisation that constitutes a *we* aims to serve a certain regime, place and context as well as specific needs. They do not present a holistic

[13]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/674209/futures-toolkit-edition-1.pdf

approach to complexity that does not flatten. Instead, they further embed current political ideas and processes into futures. These futures in the making are only known by those who are involved in the visioning.

How do we integrate public futures into traditional foresight processes? Creativity leads to embracing the complexity of futures (Miller, 2011) and increased futures literacy can aid traditional foresight practices within governance and commercial settings, as well as aiding publics. The actors and publics involved in constituting the problem may not be the ones initially assumed to be part of it, or the ones who are perceived to be able to solve it. Their capacities might also be other than initially understood (Stilgoe and Guston, 2017). Chapter Six explores this through the concept of maintenance. Within Social Futures thinking there is a need to challenge people's assumptions, what is taken for granted, as well as the traditional structures about how change can and will occur. Publics need to be at the forefront in addressing complexity. Co-creation in this way cannot be undertaken by simply looking at what publics do, as this will only reinforce top-down structures of expertise, they have to be involved in the futuring process. This is why a workshop was held (Chapter 7) to advance the knowledge presented in the case studies, demonstrating how futures literacy can be obtained and the difficulties of trying to get groups who otherwise would not think about the future in such a way to do so.

Through co-designing futures, futures literacy makes it possible for publics to invent futures that are less concerned with the barriers in place in the present. However, this is not easy. Section 7.2 explores the difficulty of enabling individuals to call into question different transitions. It is a long process, however by beginning to acquire futures literacy they become better at placing their futures in their own history and contexts. Apocalyptic claims about the risks and dangers that lie ahead as resources run out, as populations grow and as expectations escalate (Urry, 2013) are dispelled through education. Participants begin to reassess their perceptions of the present, depictions of the past and aspirations for the future (Miller 2018: 17). Official accounts of the future have not yet fully utilised these visions in their strategic foresight practices.

2.5 Conclusion

This thesis relates to the challenges of complexity of the future, and specifically in the early 21st century, when small, local disruptions are commonplace and presented as feeding into a 'bigger picture' of global disruption. Publics are made present in consideration and exploration and construction of those futures and methods are needed to help understand this. It is not enough to simply approach the future in one way, using one futures method, one discipline or approach. The past cannot be used by itself to predict the future or automatically consider the present as being vital to what comes next. Futures literacy requires a combination of multiple approaches.

This chapter has charted the need for future forming post-disciplinary research in order to enhance current modes of knowing. It does so to create a new pathway for undertaking research when complexity results in messy, tangled issues with no one solution. It has demonstrating the purpose of moving away from hyper-specialisation within this thesis, exploring the reasons for adopting a post-disciplinary approach. Often classified as 'possible, probably, and preferable' futures (Urry 2016), there is a need to develop new epistemological, ontological, ethical methods to consider how futures might unfold. This has been charted through the current work in futures studies that seeks to allow complexity the breathing space it requires – instead of levelling out the networks.

The next chapter outlines the methodologies used in this thesis. Beginning with the development of the research, it then discusses the conceptual mixed methods approach and concludes with an in-depth discussion of the empirical methods utilised. The methodology chapter presents a way of working with method in research, and how the study should develop to reach a point where action is central to futures thinking. Research involving multiple disciplines and experimental methodologies has its critics (Coles et al, 2005; Echtner & Jamal, 1997) yet it is a vital tool of enquiry as it stimulates further questions and responses. Undertaking empirical research that deals with complexity may create innovative research, yet, when addressing the

methods and theories it uses, is often frustrating. Just as no one discipline is 'off-limits', the next chapter will demonstrate how this thesis is not committed to a single method or approach. Using what is available, required and advantageous in demonstrating how best to unpack complexity and highlight how publics use infrastructuring practices demonstrates why post-disciplinary and its holistic approach is key.

As this section has shown, there is not only complexity in the case studies that follow, but also in the post-disciplinary approach taken to articulate analysis and response. The complexity of phenomenon matched by complexity in approach is held together through narratives that weave connections across pasts, presents and futures. This study is seeking new ways of addressing issues through the narratives it provides.

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3. Methods

'Identify the field of contestation, show the intricate networks of interaction, establish the role of narratives, metaphors and 'grammar of the future', disclose power relations and their effects on alternative futures'. (Adam 2000, xiii)

3.1 Introduction: Complex Cases

How do you study complexity? Just as no one cause or solution is responsible for the issues at play in this thesis, no one method is appropriate in isolation. There is a need for an inventive approach to the methods used that articulate, explicate and elaborate ways of living together that are already ongoing (Marres, Guggenheim and Wilkie: 2018). Chapter Two presented the need to approach complexity in a way that combines multiple periods of time with moments of trial and error. This chapter will now detail the methods used in the two case studies that follow. As Law states, 'an obsession with clarity, with specificity and with the definite' (2004:1) has created clinical studies that do not fit with the wider view of the world outside the discipline. Law's approach to method is useful within a post-disciplinary study, as rather than method, Laws 'method assemblage' allows us to consider the many levels and aspects of a study as well as acknowledging a 'world in flux' and enables us to imagine different forms of presence and absence. This is important when considering Social Futures as studying complexity is an approach to issues that have previously been viewed lacking clarity, to layman and expert alike. Methods can be used to probe the mess and focus on new forms of action.

Highlighting 'not what the method *is* but what it can *do'* (Fox and Alldred, 2017:1), is vital to demonstrating the importance of using case studies when undertaking a post-disciplinary study that involves something not yet realised, the future. Fox and Alldred note that methodology is a 'matter of selecting methods that can be used to achieve specific micro-political effects in the research process, and consequently specific kinds of research output'

(2017:11). Case studies address the need to incorporate different moments into a study of complexity. Yin (1984:23) defines the case study research method 'as an empirical inquiry that investigates a contemporary phenomenon within its real-life context'; when the boundaries between phenomenon and context are not clearly evident and where multiple sources of evidence are used. Using cases as a way of studying complex issues is ideal as they are used widely within design research, futures studies, history and sociology- the disciplines of this thesis. Methodologies often suggests using ways of finding information to sustain a certain discipline, combining multiple methods in this way is not without its problems. It is not a simple approach to consider multiple methods together in inventive ways. Section 3.2 highlights the issues associated with the 'friction points' that arise in detail.

Within historical studies, the case study is used to demonstrate how events 'really happened', this is done by presenting a set of interconnecting events. The goal is to document whether the sequences of events or processes within the case fit those predicted by alternative explanations of it (Bennett, 2008: 705), they are used to confirm the causal processes that are behind larger studies. This would suggest that case studies are chosen in order to confirm a larger hypothesis relating to the research undertaken. However, this assumes that there are patterns in the social world that can be captured; a sociological case presents the causal mechanisms embedded in time that create a path dependency. An individual case provides insight, drawing on data from different levels using multiple case studies increases validity. In this thesis three case studies are used to demonstrate how the practices and themes in each case relate to each other.

Gomez (2014) claims that mixed methods approaches are particularly germane and allow researchers from diverse groups to have a common language to guide their inquiry. A long history of answering research questions with different data types can be traced, even if work was not explicitly labelled as 'mixed' at the time (Olsen, 2004). What is newer is the explicit and intentional combining of different data types and analysis techniques together as a distinct methodological approach that can complement mono-method approaches (Cresswell & Plano Clark, 2007). The research in this thesis can be viewed as 'bricolage research'. A critical, multi-perspectival, multi-theoretical and multi-methodological approach to inquiry

(Rogers, 2012: 1), creating opportunities for understanding phenomena in a new way, as explored in Chapter Two. By constructing new knowledge using the available tools to hand, the more perspectives one can bring to their analysis and critique, as well as 'the better the grasp of the phenomena one will have, the better one will be at developing alternative readings and oppositional practices' (Kellner, 1999). As the introduction of this thesis explored, nothing exists in isolation and the connections that exist in everyday life are not always highlighted by disciplinary modes of undertaking research.

Over the course of my research, the design of this study has shifted significantly. This has had consequences for the appropriate disciplinary and methodological basis on which to address the thesis. Initially, this was to be a study of power – social power and its effect on infrastructure, using historical case studies, such as the blackouts of the 1970s to further understand the multifaceted nature of power. In December 2015, Lancaster experienced an electrical blackout. In this instance, I was not only a researcher in the field, conducting a participant observation or ethnography – I was a participant. I was no more knowledgeable than those around me who were also trying to find out what was going on**.** This case study forms part of the 'archive of the future', the materials that shape and inform the future scenario in Chapter 6. Whilst writing the thesis, it has become clear that the key theme within each case study and the approaches taken, is not power, but rather complexity.

A research strategy concerned with exploration and understanding (Blaikie, 2009: 124) makes possible a greater understanding of the nature of infrastructuring during disruption as a way to consider the future. The qualitative methods which have created a basis to consider the concept through an in-depth understanding of people's experiences and practices (Thompson et al., 1989) involved the usage of empirical research methods. Using multiple methods allowed a rich depository of data to be gathered, to understand everyday encounters with disruption and to think about the future. This chapter is divided into sections concerning 1974 and 2015, presenting the power at play within the physical archives and depositories used in Chapter Four continues with a discussion of the event as an archive, using the 2015 Lancaster blackout as a way of understanding the power felt by communities and the importance of the social experience of the blackout. For both case studies, ideas of space and why different

scales of place have been used are considered. Finally, this chapter discusses the limitations of the research.

It should be noted that the methods undertaken within Chapter Seven, the future scenario of 2056, are discussed at length in the chapter itself (Section 7.2). The chapter combines not only the previous research but additionally incorporates a scenario-building workshop (7.3). The methods used to construct the chapter are dependent on the content of the cases previous and so for ease of readership they are contained in the chapter.

3.2 'Sandpaper Moments': Friction Points within Post-Disciplinary Research

This thesis presents a methodological challenge: how to do justice to the complexities of individual disciplines and outlooks, whilst drawing out more mixed, reflective, detailed and connected learning and understanding. It may be 'messier', but this does not always need to be negative. Dealing with 'mess' and finding ways 'to keep the metaphors of reality-making open, rather than allowing a small subset of them to neutralise themselves and die in a closed, singular, and passive version of out-thereness' (Law, 2004: 139) is why case studies are the ideal way to explore the phenomenon. The methodology of this thesis is assembled in a way that echoes the practices of design research, highlighting the involvement and concern of 'publics' (Le Dantec & DiSalvo, 2013: 242). Through the narratives constructed in each case study, different Social Futures are highlighted. The case studies presented differ in their scope and boundaries yet, they demonstrate not only the nature of blackouts in 1974 and 2015, but additionally the ways in which futures and change occur. In order to avoid a narrow view of the future 'there is a need to present ideas of futurity that are based on action. Engaging existing futures methods with practice informed research that demonstrates how people are 'making futures' to engage 'ordinary' people in investigating futures and future making processes (Le Dantec and DiSalvo, 2013), is vital to moving forward and creating better futures.

Combining multiple methods is not simple. Research has been separated by disciplines for years, and although a welcomed approach to fostering collaboration (See Chapter 2.1) it has

been noted that the shift to interdisciplinarity has seen disciplines unified excessively, and at points, forced (Mirowski, Mirjam Sent, 2002). Using multiple disciplines focuses on mess and material practices (Donaldson et al. 2010), agonism and ontological plurality can be more generative than convergence and integration (Barry et al. 2008; Demeritt 2009). The practices of bringing disciplines together can shape knowledge – and the world – in particular ways (Kwa 2005; Szerszynski and Galarraga 2013). By considering the different modes of interdisciplinarity and the struggles that occur within them, Barry et al. (2008) highlight how problems should first be considered as interdisciplinary, rather than the method that needs to be applied. Through acknowledging limitations of 'expertise', involvement of non-experts in research has implications for practice precisely in so far as it cannot be dismissed either as an expression of a pre-determined politics or as a response to demands for accountability (Barry 2008). Thus, the post-disciplinary takes place in research that still draws on disciplinary approaches as research incorporates new voices into these methods in order to create responses that involve publics. Disciplinary differences are not erased or minimized, but acknowledged (Lury 2012: 2). This in itself creates friction, these points of resistance highlight the need of the researcher to consider their responsibility in a way that attends to the dimensions of the responsibility of the research and the role they should play in presenting it.

Am I an expert? I am writing a PhD about complexity; therefore, I must know more than the 'ordinary person'. Does this mean I am just enforcing traditional research structures? But I am an ordinary person, I lived through the event, does this mean I am an expert in a different way? These are all questions I struggled with during the writing up of this thesis. How do I present the voice of the publics who experienced these events first-hand? Using post-disciplinarity embraces this friction by using methods that bring non-experts into the design, and creation of future scenarios (through their maintenance in Chapter Six and the scenario of Chapter Seven).

During disruption, the expected everyday is paused, a future once expected does not occur in the way expected. As Chapters Four and Five demonstrate, those experiencing the event become the experts when dealing with blackouts. They develop new ways of 'gelling' points that would not automatically sit well together, creating new ways of seeing and learning from

futures that are presented during the event. The ways in which they bond such methods through new infrastructuring processes provides a tool for combining past, presents and futures – as well as multiple levels of responses to disruptive events. Chapter Six highlights how the past is used in the present as a way to look forward to the future, whilst demonstrating how expertise shifts after a disruptive event. The moments that are most abrasive can break down the complexity, highlighting how things can change and the actions that are needed. Demonstrating how the frustration of methods not working as intended can be embraced in the 'real world', not just theoretically, using uncertainty to produce relations beyond themselves – the incompleteness and mess of these moments aids post-disciplinarity.

However, presenting these moments in research alongside the participatory actions that occur, requires a level of choreography for the sources to work together. In this thesis this is achieved through initially keeping the cases of Chapters Four (1974) and Five (2015) separate, presenting the breakdown of daily events and new practices that were formed in these moments in their own dedicated sections. Chapter Six begins to bring the two together, finding synergies and differences. These case studies can be viewed as 'experiments for living' (Lezaun, Marres and Tironi, 2017) as they are used in Chapter Seven. With the formulation of the future scenario to demonstrate how collective practices make public the implicit normative powers of material objects, the events presented in the case studies allow us to implicate the public in matters of common concern, whilst putting 'our ontological commitments to the test' (Marres, 2012). This adds another layer to the points of friction within the research, the material. Electrical blackouts are a key moment for demonstrating the importance of physical infrastructures within infrastructuring processes, as the ways in which these are designed create the foundations for new relationships between the two. In order to assess these relationships, detailed accounts of each moment are needed. The following sections explore the methods used in Chapter's Four and Five respectively and the approaches taken to break down the complexity, whilst building the foundation for considering a future blackout scenario in Chapter Seven.

3.3 Methods in Chapter 4

> 'The past can only be interpreted within the limits of materials and of the conceptual tools to hand' (Samuel, 1980: 162).

Chapter 4, *The Power Problem*, takes a historical view of infrastructure disruption and involves an analysis of electrical blackouts and infrastructure breakdowns, moments of change. To explore the discourses used within the case study of the present, this chapter uses archival research to illustrate one example of power, both in energy and politics. Historians do not have exclusive access to the archive; historical research is found in sociological discourse, yet there has been little sociological interrogation of the archive as a site of knowledge production and erasure. Tosh states that historical method is little more than 'common sense', that is systematic, supported by a clear grasp of historical context and a high degree of technical knowledge. This section highlights how power is embedded within the archive and how the archive has been used, showing how pauses of the present are difficult to find in traditional archives. In 1974 all of Britain was affected by energy disruption and as this chapter will demonstrate, the extent of the source material available indicated that a national approach was appropriate in order to present a study of 1974 that was not fragmented.

As Emmel et al. suggest, social research often relies on gatekeepers to act as valuable resources in serving to initially 'build trust in the researcher participant relationship' as well as building 'relationships of credibility' (2007: para. 2.1-2.3). Within historical research, archivists can be viewed as gatekeepers presenting material to the researcher. Despite the 'participant' being the archival information, access to sites and information for this case study was mediated through various gatekeepers (Reeves, 2010) and negotiation was required. Within the practices of historical research, the 'archive' can be defined as the depository of information and data itself, the boxes, films, documents, newspapers, objects. Interaction with archives has been dominated by the need to identify the range of material within collections, to access relevant documents, and to interpret their contents productively (Cunningham, 2008). This all requires the help of those responsible for the preservation of information, the archivist, whose profession and role within an institution comes with its 'own

pyramid of titles, powers, rights and duties (Brown, 1998: 21). The archivist not only holds a form of surveillance and power over the information available to the historian but is the initial contact and the point of contact before the visit to the archive. Information is only accessible once a relationship has been formed with the archive and knowledge of the institution gained by the participant.

Initial discussions with archivists about the subject and nature of my research suggested that information was not going to be easy to find. An initial search of a range of databases and archive catalogues produced little information explicitly relating to electrical blackouts and the disruption of the 1970s. Information available visually through photographs of specific sites or online in forums, even 'on this day' sections of news outlets did not have a corresponding paper trail in the archives. For example, Westminster City Council archives had no information about the effect of the 1974 blackout on Piccadilly Circus itself, yet the BBC had incorporated it into a national news story and the Getty Images archive had images of the event.[14] Correspondence with the archivist at Westminster suggested that a visit was not going to be worthwhile.

Email correspondence with Lancaster University's archivist regarding the university during the power cuts in 1974 is typical of these conversations:

> You may find it hard to believe, but the university moved smoothly forward during that period. Staff brought candles in to their offices so that their work could continue, and we still had access to manual typewriters as well as early electronic ones, making it possible to continue work as usual. Student teaching and accommodation were unaffected. This means that the information about this period will mostly be in the form of ephemera, and therefore slower to track down.[15]

[14] http://www.bbc.co.uk/news/uk-england-london-38610332)

[15] Personal correspondence with author.

Similarly, when enquiring about the contents of The National Grid archive, the archivist informed me 'we probably do not hold the information you require'.[16] The archivist can play a significant role in the context of discovery and the questions that are explored in research. As gatekeeper, the archivist, who knows the extent of the catalogue but not the individual details of each source, holds power in being able to facilitate initial visits. The archive itself is not 'innocent of struggles for power' either. As Burton (2005), notes, it is a site of political, cultural and socio-economic pressures the future is embedded within the structures of the archive before any research has been undertaken.

Suggesting that there are only ephemera available to provide information about a scheduled, Government dictated moment of disruption highlights the invisibility of energy and disruption. Infrastructure exists all around, yet it is only documented when its design is being built or dismantled, these moments of short-lived disruption are pauses that do not have reams of official documentation. This may suggest that they are either believed to be 'one-off' moments and unlikely to happen again, or a moment not worthy of documentation because it does not fit with the expected design of the system. This complexity is relevant to the thesis as when looking towards the future and considering change, it highlights how these moments may be omitted from narratives and future scenario planning as there is little information created at the time of the original event. This is why archival research in Chapter 4 has been supplemented with newspaper articles, images and artefacts to provide an overview of the contexts and impact of disruption in 1974 that is not biased towards the 'state view'.

Invisible aspects of the past are not uncommon within studies of Social History and 'history from below'. This historiography concentrates on the experiences and perspectives of ordinary people, contrasting itself with the stereotype of traditional political history and its focus on the actions of 'Great Men'. This mode of historical research uses oral histories and objects to provide narratives that are omitted from the archive. The lack of initial information in the archive demonstrated how important national collective memory is in creating the

[16] Personal correspondence (email) between the author and the National Grid Archive.

image of the 1970s; this memory of the event is explored within the case studies. In order to avoid nostalgia, archival research on the event was viewed as the most appropriate research path. See chapter 6 for a discussion on this issue.

As Chapter 4 discusses, even professional historians have jumbled-up knowledge of dates and events in the formation of the historical view. At Lancashire County Council archives, I was informed that the tapes of radio recordings I required access to were not on an accessible format. Even if I gained permission from the BBC to convert them (which due to copyright could only be listened to at the County Archive), they were possibly water damaged. Had they not been, the audio was highly unlikely to have provided information about the blackouts. When trying to contact formal organisations responsible for co-ordinating emergency response to the blackout, a key concern was whether the research would report favourably on their role during the disruption. This was also a common theme when approaching potential research participants for the case of the Lancaster 2015 blackout. Once the event had occurred, the disruption was made invisible again very quickly. In terms of participants, this was because of the way in which their role was presented (Chapter 6 has a discussion of this).

The chapter also has parallels with social history in that it considers social factors as part of the energy transition and moment of change in 1974, rather than solely the political events occurring at the time. It does not seek to inform the reader of the place of politicians and the formation of policy, but rather the effects and consequences on everyday life. The archival research of Chapter 4 is from a range of archives; The National Archives (TNA), Manchester Museum of Science and Industry (MOSI), Warwick Modern Records Centre (MRC), Lancashire County Archives and the National Football Museum. In addition to using the digital archives of national newspapers and image depositories, each archive presented its own issues and ‘problems’ when researching. Primarily, the subject matter that I wished to pursue was not part of the official narratives of the archive.

Chapter 4 can not only be viewed as a historical example of infrastructure disruption, but additionally a temporal domain that highlights how the future is embedded within historical

research, and the need to demonstrate an understanding of the decisions and consequences of historical scholarship. Searching for an invisible phenomenon is time consuming and requires a search for information that might not automatically be assumed to be relevant or connected. At MOSI, there is currently no central archive catalogue. Instead, the archivists hold Excel spreadsheets for each separate collection. In order to access the collection, they have to be aware of the nature of the research and what might be suitable material for the researcher. The researcher can request documents within the archive, and is allowed 3 archival 'objects' at a time. The material that is used in this thesis from MOSI comes primarily from the Electricity Council Archive, the national archive of the electricity industry in Britain. It consists of business records, photographs, drawings and film which provide a record of the development, supply and use of electricity from the late nineteenth to the late twentieth centuries. However, despite charting the development from 1900-1990 the records present an institutional view of electricity generation and supply in Britain**.** The spreadsheet I was presented with contained the metadata of 1806 files; all with brief descriptions. Through a systematic approach of restricting dates to between October 1973 and March 1974 in the first instance, I reduced the number of files from which to search. However, this still resulted in a large number of results and with descriptions such as '53rd-59th Meetings papers 393-443, agenda and minutes, Oct 1973-Jul 1975', the only way to search for information was by requesting the items in the reading room.[17] This is a long process, in total a month was spent at MOSI researching the blackouts and energy crisis of 1974.

The use of football in the case study demonstrates how a typical everyday practice is affected by blackouts and power shortages, records held by the National Football Museum archive presented a lens through which to understand the leisure practises during the blackouts of the 1970s. When I visited the archive underneath Preston North End's stadium at Deepdale, with only instructions to press the bell 'next to one of the many blue doors on the grandstand side' I was unaware of what I would find or if I would be accepted by those within the archive space. Researchers in the archive had specialist knowledge of football teams and history. For example, I spent my time in the research room with men who were able to recall the exact

[17] Electricity Council Archive Catalogue (Museum of Science and Industry: Manchester).

score for Preston North End matches that took place 50 years ago. Speaking to these fans was more effective than spending hours in the archive, as they were able to provide leads to resources that even the archivists were unaware of. Additionally, going into the archive and having to physically find my own data instead of the clinical nature of 'order and receive' meant my documents were placed on top of objects that were related to different aspects of footballing history. Although the narrative I have explored in this thesis is one of disruption, the events, people and places are part of a wider narrative that could form a completely different thesis altogether. Studying football and including it in this thesis was driven by analytical considerations, but it was not formed by the official memory of the blackouts that is present today - one that places politics as the defining feature - as Chapter Four shoes.

Many records that refer to the dealings of the state, such as those held by MOSI and the TNA are only covered by the Official Secrets Act's 'Thirty Year Rule', meaning that although information relating to 1974 was made available in 2004, the breadth and scale of information available means that many of the documents used in this research are ones which have not been viewed since they were created. This was also the case with the Football Museum archive, but for a different reason - the minute books of meetings held after 1973 were still in the office of the Director, with the collection's assistant informing me that he would need to 'go across the road and hassle John Kay [the director of Preston North End], then you will need to write to the FA and see if they will let you look at them'. Power lies with different social actors on different scales.

Another aspect of memory and the public that is embedded within the archival material used in Chapter 4 are diaries and newspapers. The two diaries referred to in the chapter are those of Tony Benn and John Burton. Tony Benn was a Labour MP whose diaries from 1940-1990 are widely available and sold as a popular autobiographical account of British politics. John Burton was not a public figure but the owner of an angling factory in Preston, whose business archive was acquired by Lancashire County Archives. Although both diaries are personal accounts across the same period, they present different ideas about the nature of private and public lives. Alaszewski states that diary research is 'natural' as it allows for a view to be harnessed that is not imposed or affected by project concerns (2006: 37). Whereas Tony Benn's diaries have been heavily edited, John Burton's diaries have not been changed–

without the knowledge that they would be used in the future as an account of the 1970s. Letters to newspapers that have been included are representative of the emotions felt by the public during disruption, but as the authors were expecting these to be published they may have exaggerated and written to cause reaction. The use of personal documents in the thesis is adjunct to other sources of data, but they provide a way of viewing the entanglement between private and public that was at play.

The utilisation of archival material relied on my own interpretation of texts, images, artefacts and making these comprehensible within the narrative of this thesis. Many of the terms of this investigation are determined by my own choices as a historian, motivated analytically by the decision to highlight the everyday experience, the dates chosen and the actors considered. The historiography here is imbued with perspectives that are political in tone and as this section has shown, power is inherent in the archival material before the research has even been conducted. It has highlighted some of the issues encountered during the fieldwork process, and how they contribute to the wider discussion of publics and visibility. However, this historical research and archival aspect has not considered a 'real blackout'. Chapter 5 presents the Lancaster blackout as a further repository of the archive of the future, a concept explored later in this chapter.

3.4 Methods in Chapter 5

Chapter 5 takes a local view of an electrical blackout and focuses on the city of Lancaster. The experiences of individuals provide a rich understanding of a phenomenon because the researcher must use a wide range of sources and data. This provides a nuanced understanding of the phenomena being observed (Yin, 1994). As Burrell argues, research sites have often anthropologically been conceived as "bounded and disconnected" spaces that researchers, 'enter'. These spaces are the result of a process of "exclusion and inclusion, indicating what the research does and does not cover" (2009: 182). As opposed to the power cuts of 1974, the blackout of 2015 had a clear boundary as 60,000 people lost power in the Lancaster area. Both local and national experiences matter within the web of complexity because they demonstrate different scales and how complexity on different levels can be addressed. There

are of course also global and planetary scales to the problems of climate change and neoliberalism.

As a site to highlight the impact of design, focusing on one site allows a deeper understanding at variable material infrastructures and practices of infrastructure making and infrastructuring. With a demographic representative of much of England (Lancaster City Council, 2016), Lancaster is an 'ordinary' place in terms of the people, however the city's relationship with physical power networks is special. Situated on the 'energy coast', the historical infrastructure landscape includes two nuclear power stations in Heysham that employ over 1500 people from the local area. The introduction of fracking and wind farms along the coast adds 'future' methods of power generation to the city and the local area. By examining the ways in which the Lancaster 2015 blackout was remembered after electricity had been restored and the construction of memory in that context, using the community emergency plans as an example of a 'tool of maintenance', creates a new method of viewing change. Chapter Six addresses this short-range future action after Storm Desmond.

The environment and the spaces that infrastructure breakdown affect are fluid and ever-changing. The spaces addressed in this thesis present themselves as an archive, offering up reminders of social and cultural processes, imaginaries, struggles and events. However, the 'invisible' nature of electricity – only evident through other objects - means that no physical traces of the blackout itself remain once power has been restored. This temporary transformation of space is a key feature of the invisible that has been significant, either acting as catalyst for transformation or as coping and informal mechanism for everyday resilience after the event. Presenting both national and local case studies challenges existing ways of thinking about power, as it warrants an explanation of different structures and mechanisms that are both planned and unplanned.

Within a thesis that deals with multiple moments and timescales, presenting the case studies in the order they occurred creates a timeline. Although the blackout only occurred in Lancaster, the use of social media (addressed later in this chapter) demonstrated that although there was a clear geographical boundary to the physical aspects of the blackout, the

social boundaries of the blackout existed outside of this space. For example, people were communicating with family and friends spread across the country and globally, as the blackout impacted on many international students.

Although a personal account was written (included in Appendices) I chose not to frame the case study of Chapter 5 in a solely auto-ethnographic way as I was part of a community, as I reflected upon in an auto-biographical account written the day the power came back on:

> 'Lancaster is a place where strangers often talk to each other on the street but the flow of conversation felt a lot more natural, boundaries had been broken down as we all shared the common experience and even if I didn't talk to every person I came across whilst walking around, I felt comfort in that I was in a community experiencing this'.

In December 2015 I was one of 60,000 residents who experienced the blackout, but the case study is not solely a self-narrative. Auto-ethnography as a methodological strategy involves collection of data by means of participation and self-observation (Chang, 2010), a good method that allows for an author's own experience to be the central thread of the case study. It was not the most appropriate tool to use to understand the power relations at play during this time, although ethnographic participant observation 'entering a particular site and group operates and what it means to be a member of that group or site' (Geertz 1973) could have been utilised during this period of disruption, my own situation – the bottom floor of my apartment block had flooded and I had no water or electricity – meant that I was more concerned with my own safety than going out into the field at that time. Interviews with residents were conducted after the event to provide other perspectives.

The process of finding participants for interviews proved to be more challenging than first thought. As an entire city had experienced an event, I expected that it would be easy to find participants willing to be interviewed or take part in focus groups. However, as the city recovered from Storm Desmond, the blackout became a part of its cultural heritage and memory, many residents and businesses had already shared their experiences of the event

several times in an informal setting. Although perhaps unfamiliar with the process of a formal interview - as the interviews were solely about experience, many in Lancaster had shared their stories informally with other residents (the Lancaster Past and Present Facebook group is a clear example of this) and were used to talking about this event with others and were not motivated to participate in interviews. As Mullings argues, positionality in methodological literature often conceives of observers as either 'insiders' or 'outsiders' of the research site. 'Insiders, researchers who study a group to whom they belong, have an advantage because they are able to use their knowledge of the group to gain more intimate insights into their opinions. By contrast, 'outsiders' argue that by not belonging to a group under study, they are more likely to be perceived as neutral and therefore be given information that would not be given to an insider' (Mullings, 1999: 340). Within my fieldwork I was both an insider - I had participated in the event- but also an outsider because I intended to use the event as part of a wider research project and understand individuals' responses.

As an 'insider', a resident of Lancaster with family connections, I came across potential interviewees in various places around Lancaster, the supermarket, the street even at a wedding. Unsurprisingly, the lack of reliability of those who regaled their experiences to me after several pints means that their evidence has not been included in this thesis. Despite this, the conversations that I had highlighted the social nature of the disruption and the community aspect of the event, the sharing of knowledge which occurred during the blackout helped to form new communities following the event**.**

Unstructured interviews are conversational (Bryman, 2012: 471) and rely only on very brief notes to discuss a range of topics relevant to the study. However, these work only when the interactions with participants throughout a study are always informal (for example Goulding and Shankar, 2004). In order to provide a framework for discussion, set questions were used during each interview whilst remaining flexible enough (see Drever, 1995) for the participant to become more conversational and expand on their own individual experience. The semi-structured nature allows data from different participants to be compared and contrasted at a thematic level (Gale et al., 2013: 2). Structuring the interview in this way was important for the study, as it enabled an understanding of how individuals responded to the event. By

providing the same questions to each participant threads could be seen as to how the community formed a public. Fontana and Prokos suggest that 'the interview has become a routine and nearly unnoticed part of everyday life' (2007: 13), proposing that the interview context will be a popular one for 'allowing respondents to be the experts and to inform the research' (Leech, 2002: 668). In Chapter 5, the case study of the Lancaster Blackout, the participant is not only the expert during the interview, but within the networks of knowledge that played out during the event – residents became the experts, holding the most information about their situation.

Initial questions and prompts were as follows:

1. To get things started, if everyone could introduce themselves and outline why they are interested in talking about the Storm Desmond blackouts, that'd be great! I'll kick things off…

2. So (drawing on some of the aspects mentioned by participants in what they hope to get out of the session) How did the blackout happen to you? What things stood out as being important? Why are they important?

3. What did you do differently during the blackout? Was anything made easier or more difficult for you during the blackout?

4. (Frame based on responses to previous discussion) And how important was that for you? Is this something that you think is significant?

5. To what extent do you understand the infrastructure that is in place in Lancaster? What do you think infrastructure is?

6. Has anything changed for you since then as a result of your experience? Does anyone here think that the way in which they interact with power has changed in the last year as a result of your experience of the blackouts? In what way?

7. Do you think differently about what might happen in the future because of the blackouts?

Prior to interview all participants were given an information sheet and consent form (See Appendices 1, 2 and 3). The questions above were also used as a focus group script. One focus group took place for the case study in Chapter 5; the intention was to do more, however due to issues of participant recruitment and pragmatic limitations only one (with five participants) took place for this study. Focus groups are time consuming to facilitate (Bryman, 2012: 517), whilst accessing participants who are willing to engage in this process is often difficult (Silverman, 2013: 212). Analytically, Kitzinger also recognises that 'the downside of such group dynamics is that the articulation of group norms may silence individual voices of dissent" (1994: 300). In this way, there is the danger of participants 'being more prone to expressing culturally expected views than in individual interviews' (Bryman, 2012: 518). This was not the case during this focus group, as participants did speak about their differences in experience and beliefs. However, the group dynamics did not permit a full exploration of the details of 'individual biographies or the minutia of decision making' (Kitzinger, 1994: 116), as frequently a participant would state that it had been 'the same for them' without divulging the individual nuances of their experience.

Central to all interviews and participant feedback in the focus group was the importance of the residential community of Lancaster coming together. Although this involved building new physical social networks, individuals also relied on existing digital platforms to understand and cope with disruption, in particular the use of Twitter and Facebook. Social media was used to work in conjunction with the other data compiled for Chapter Five. Comparing three crisis situations in 2005, Thelwall and Stuart (2007) examined how different communication technologies were used. New communication technologies were seen as especially useful for sharing information and fact-finding in the initial stages of the event, after which mainstream media outlets were able to deal more successfully with covering the aftermath. Although not a crisis on the scale of Hurricane Katrina (one focus for Thelwall and Stuart), social media during the Lancaster blackout was used in a similar fashion. Where news outlets were

focussing on other aspects of Storm Desmond and failing to report on the event, social media generates a mass of self-report data about social media user's perceptions of the event. In order to create 'thick description' (Geertz, 1973), a detailed account of experiences, tweets to and from institutions dealing with the disruption have been used throughout the narrative approach to the blackout in the chapter to highlight another form of social relationship during disruption.

During the blackout, Twitter was essential, a space where information and communication was shared. As part of the 'networked society' (Castells, 1996) social structures are less hierarchical, partly because of the increase in digital communication (Adam Edwards et al, 2013: 247). Searching Twitter for 'Lancaster Blackout', 'Powercut Lancaster' and '#stormdesmond' within the dates of the event presented a data-set of tweets sent relating to the disruption during the event. These were used to gain an insight into the behaviours and perceptions of those who would not necessarily choose to partake in an interview, whilst providing a way to monitor the interaction between governance and society within the event. This was explicit in the conversations between Electricity NorthWest and those affected by the blackout, as this interaction presents a way to analysis the difference between online and offline social relations. Social media took the blackout away from the physical boundaries of those living without electricity in the Lancaster area, due to the communications towers in the city centre being disconnected those who could access the internet from within Lancaster were few. The impact of the blackout extended beyond Lancaster to those not in the area. The use of the hashtag '#stormdesmond' also enables the blackout to be read in the wider context of the storm and its impact elsewhere.

Using this data raises several questions about the ethics of using social media in research data. Here the data is posted onto public sites (Twitter and Facebook) and although it could be sensitive in some cases, anonymity and privacy is maintained. Twitter handles (profile names) are anonymised in the data set and any identifying features removed from quotations. Those who post to these sites are doing so with the expectation that strangers will be viewing their profile, the data is not private and their posts can be reposted, commented on and liked by

others who they have not chosen to 'follow back'. When writing up research results quotes are used that cannot be used to identify the platform user.

Although there are a number of reasons why the use of social media and 'user-generated data' is regarded as secondary to traditional qualitative methods, the empirical analysis in Chapter Five presents the data as part of a wider narrative. The prevalence of misinformation online, the limit to 140-character tweets (at the time), the anonymity of the writer present challenges - In the case of this research study, the main use of the data was to understand why and how knowledge exchanges occurred.

The tools employed throughout this study encourage natural responses from residents and those affected by the blackout. The interviews provide insights into individual's roles and the power that people believed existed during the blackout because they were part of a community, be that on or offline.

3.5 The Archive of the Future

Chapters Four and Five are brought together in Chapters Six and Seven to consider the future. In order to do so, their content, findings and data is taken to be an 'archive of the future'. Using this neologism is useful, combining the repository of the past with the projects of the future, the term presents a way that holds up archives as vital to not only the expert in demonstrating change, past experience and present acknowledgements of issues that occurred previously but additionally a space used in practice. As the previous sections have demonstrated, the process of categorizing, classifying and preserving archival documents ensures not only their access in the future but additionally creates new meaning. The concerns of those involved in the archiving process are unaware of the requirements of the information in the future. This negotiation of the past, which is unfolding many new dimensions in social memory and generating huge quantities of archives, 'constitutes the ground on which the transformation of archives is being played out' in their processes and retention' (Harris, 2002: 66). The archive is responsible for preserving the facts that serve as memories in the future.

Disruption, although highly visible at the time of its occurrence, is made invisible very quickly in practice, for good and bad reasons. It is only visible at the point of breakdown, the knowledge and power within these spaces are central to this thesis, but disruption in the form of electrical blackouts is absent from the archive because it is hard to capture and also unwanted within the official narrative of the system. It is not part of the design of the system, expected and accounted for. Disruption highlights disrepair and lack of maintenance of not only the physical structures, but also the power structures at play. Lack of visible information in the archive highlights this, as those who are responsible have not retained information for future reference.

The role of Chapter 6 is to consider the future in relation to the case studies of 1974 and 2015, focusing on the systems that were created and implemented after disruption. Here infrastructure becomes the architecture of the archive of the future; holding up the past, keeping certain aspects in and out of sight and access to parts of the system only granted or used by certain publics. The politics of this archive has been given its role in years of grounding certain authorities as key and maintaining a certain social order. The chapter demonstrates the struggle to turn the archive, in this case the knowledge of power and infrastructures from having restricted access only to 'experts' into one that is open and public, where the community can use the past to shape how they interact with the future. Infrastructuring becomes a tool in connecting pasts to presents and futures.

3.6 Limitations

Despite there being a lack of consensus on how to judge the validity, reliability and generalisation of the results within qualitative research (Leung, 2015), as social research 'inextricably ties in with human senses and subjectivity (2015: 324) the limitations of the approach taken should be acknowledged. Leung notes that data in quantitative research is "very specific to the test[s] which it is applied" (2015: 603). There cannot be a 'one size fits all' approach in qualitative research towards ensuring reliability and validity. Within this thesis, the main limitation is not the quality of the research itself, but the nature of data collection and fieldwork. Within a purely sociological study, a myriad number of informants would be interviewed and participant observation takes place over a longer period. Fifteen

participants lent their voices to Chapter 5, yet through an assessment of newspapers, radio, visual culture and social media they became part of a wider analysis that did not solely rely on the interview method. Understanding the many connections of a study requires no set research questions, or set methods. The number of interviews may be small but this study is not seeking a representative insight into the experience of Storm Desmond, rather a qualitative understanding of disruption. It should also be noted that the methods I have chosen are appropriate to the limited resources a PhD has.

3.7 Conclusion

Studying micro-events, small moments of disruption and the daily practices that occur, is important as it highlights how power is embedded in the everyday and shapes cultural norms. The methods employed within the two case studies discussed in this chapter create the basis for a new approach to futures thinking. The tools discussed in this chapter have charted the development of the case studies. In doing so, this chapter has considered the power at play within the research, the questions of 'doing' the method and the issues encountered. The first case, a historical analysis of 1974 demonstrates how the public is embedded within infrastructuring processes and how energy is 'vibrant matter' (Bennett, 2009) imbued with politics. The second case study looks at a 'revelatory moment' - the disruption to electrical power caused by Storm Desmond in 2015. As expressed in this chapter, each case study can be viewed by itself as a moment of change, or they can be read alongside each other to understand complex social shifts and patterns.

Taking. the archive as its key approach, this chapter has highlighting some of the key concerns of using multiple methods prior to a discussion of the event. The points of friction, employing certain methods within spaces they are not usually used, has value within this study for demonstrating the difficulties of conducting post-disciplinary research – learning as we go along what works and what does not within specific contexts. These methods can be viewed as a 'starter kit' for Social Futures. Chapter Six utilises the 'archive of the future', by looking at how the events were remembered shortly after the disruption. Chapter Seven demonstrates how the case studies form a basis for creating future scenarios, drawing on data from different levels. Through the discussion of methods, the notion of what is made

visible within empirical research has been introduced as well as the ways in which the empirical methods employed in this thesis allow an exploration and investigation of issues not considered within futures discourse that deals with complexity.

4. 'The Power Problem': Power Cuts during the 'three-day-week' of 1974[18]

4.1 Introduction: Why 1974?

> 'We have grown used to electricity. We do not think of the people whose work it is to see that electricity is there when we press a switch. The only person whom we see is the man who comes to read our electricity meter'.[19]

This extract from *The Public Services: Electricity: A Ladybird Easy Reading Book* (1966) highlights the relationship between electricity and user during Britain's post-war period. Since the nationalisation of the coal, gas and electricity industries in 1947, State ownership of vital public services had allowed the State to play a central role in its infrastructure. By the early 1970s – the decade that this chapter is foremost concerned with - to not have electricity was viewed as strange and unwanted**.** In 1973 Hannah Hauxwell, a farmer in an isolated part of North Yorkshire, found herself an overnight celebrity, after media coverage of her life without electricity or running water. As a result of the coverage, local factories raised money to have her connected to the vital utilities.[20] By the late 1960s, electricity was perceived to be omnipresent and constant, available 'when we press a switch'.[21]

[18] *Football Association News,* Vol 4 (1) January 1974, p. 8. National Football Museum Archive

[19] I.J. Havenhand, *The Public Services: Electricity: A Ladybird Easy reading book*, (Wills and Hepworth: Loughbourough, 1966), p. 6.

[20] Hannah Hauxwell, *Seasons of my Life* (Orion: London, 1989).

[21] Havenhand, *The Public Services: Electricity*, p. 6.

However, the 1970s saw the end of the 'post war consensus' (Pemberton, 2013), political co-operative attitudes and those 'whose work it is to see that electricity is there' when switches are pressed came into sight.[22] Whereas nationalisation had been viewed as a way to solve the 'deep rooted labour problems in Britain' (Hannah: 1987, 87), labour problems in the 1970s caused electricity to become the battleground of social issues, that both revealed different kinds of power, creating and reorganising publics around them.

Although this thesis concerns itself with blackouts it should be noted that during the post-war period, the term 'blackout' in popular culture often referred back to blackout techniques - the minimising of outdoor light during war, as this was still in living memory. As such this chapter will refer to power cuts and not 'blackouts. The threat of a power cut was commonplace throughout the 1970s. Industrial action amongst electricity workers in 1969 and 1970 caused regional power cuts, as there was a lack of supply to the consumer.[23] In 1971, an overtime ban by the National Union of Mineworkers (NUM), prior to strike action in January 1972, meant coal supplies to power stations were heavily reduced (Hall: 1981, 74). Power stations were 'under siege' during the dispute – 'coal, oil, engineering materials and food for the canteen stopped going in'.[24] The relationship between physical power and social power converged and was changing, as Britain became aware that 'a big shutdown was on the way'.[25] Although those on strike were not on doorsteps physically cutting off the electricity supplies of consumers, their actions meant that for many in Britain, the action of pressing a switch would not always lead to automatic power.

These moments of industrial action were short lived, yet the problems did not ease. In the winter of 1973, the NUM were threatening to strike again due to pay. These threats were to add to other geopolitical and domestic political tensions - the OPEC Oil Crisis and rising

[22] *Ibid.*

[23] Michael Crick, *Scargill and the Miners* (Penguin: Harmondsworth, 1985), p. 12.

[24] Frank Ledger (part 7 of 14): An Oral History of the Electricity Supply in the UK', *British Library Sounds. Industry: Water, Steel and Energy,* http://sounds.bl.uk/oral-history/industrywater-steel-and-energy/021m-c1495x0001xx-0007v0 [accessed 05 June 2017]

[25] *Evening News*, February 11 1972, p. 1

inflation. On the 11th January 1974, John Burton, owner of a small angling equipment factory in Preston, summarised the situation in his diary:

> 'The world is going mad. The Arabs [during the Arab-Israeli war] have introduced a new technique. As they control a large proportion of the world's oil, outside America and Russia, they have threatened to cut off supplies to all countries helping Israel… starting as a political weapon it has now developed into the strongest of all economic weapons – a monopoly. Nearly all of Europe is dependent on the Middle East for oil and to bring our situation home to us they have cut down our supplies. This has created an energy crisis as many electricity generation plants are oil-fired.[26]

This chapter focuses on 1974 rather than 1972, as it was not only the leaders of the NUM causing strain to be placed upon Britain's vital infrastructure, but also global issues that created new power relationships. There was conflict on a global and national scale, as well as within industry. John wrote; 'as if this was not enough, the miners are ''going slow'' on coal production and to further sweeten the situation the railways are ''going slow''. As this conflicts with Heath's wage freeze, the battle is going on at the present time'.[27] The overtime ban that the NUM had successfully used as a bargaining technique in 1972 was used again in 1974, when power stations were already under pressure from a decrease in oil supplies.

During the early 1970s due to rising inflation, pay for those in the public sector was capped and by 1973 coal miners' wages were at a level that saw them placed at eighteenth in the league of industrial workers pay. Rising oil prices as a result of the Arab-Israeli War as well as the increasing tensions between union and a Government that was attempting to introduce pay freezes and restraints to help the economy meant that in late 1973, the NUM voted to strike if their pay demands were not met. Prime Minister Edward Heath refused to give a 7% pay rise, declared a state of emergency and introduced a three-day working week. The General Election and the Industrial Relations Act meant that picketing and campaigning was low key compared with previous strikes. The 1972 Miner's Strike had seen mass picketing at

[26] Lancashire County Archives DDX 2952/1/9

[27] *Ibid.*

power plants and depots across the country, preventing fuel from leaving sites. On the 9th February 1974, the miners came out on strike. Heath called a General Election for the 28th February believing that the country would be in sympathy with him, but the Conservatives were defeated. The Labour Government and the miners reached a deal shortly afterwards and the strike ended.

John concluded his opening statement in his new diary (the first entry he had written since 1964) with a reflection on his own work and the 'three-day week',

> 'To conserve energy all industry is on a three-day week. My works have taken Thursday and Friday off and will continue to do so as long as the crisis lasts…'[28]
> 'This unreasonable attitude is hurtling the country back to a third-rate power. It takes no account of the suffering of the public and most positively the old age pensioners'.[29]

The diary gives no indication if the perceived madness was the reason for John's restored diary writing, yet this opening record that details the effect of various political bargaining tools on energy and the public 'suffering' as a result, clearly demonstrates why the situation was labelled as a crisis by contemporaries of the time. 'A profoundly serious crisis' that required national unity, with all aspects of life affected – from food production to domestic vehicle use.[30]

From a historical perspective the period has also been labelled as such, due to fact that 'the pace of historical change seemingly accelerated and two existentially different futures were immediately possible; that is, as situations that demanded immediate and fundamental decisions and actions' (Bosch and Graf, 2014). As Koselleck notes 'the question of the historical future is inherent in the crisis' (1988: 127), a moment that is subjectively brought into existence by narratives – rather than a set of properties. Hay states that in the case of crises, State power resides 'not only in the ability to respond to crises, but to *identify, define and constitute* crisis in the first place (Hay, 1996: 254). Understanding crisis as process is vital

[28] *Ibid.*

[29] *Ibid.*

[30] Reginald Prentice cited in Tony Benn, *Against the Tide: Diaries 1973-76* (Hutchinson: London, 1989), p.85.

to understanding what succeeds the moment, there are connections to what has gone before and what will come next. The moment of disruption does not exist in isolation; it is connected to other events, times and spaces.

For this reason, this chapter focuses on the events of the energy crisis and in particular what occurred during the 'three-day-week' that occurred between 1st January until 7th March 1974 as it seeks to address the idea that there was an acceleration of change and practice during the crisis. In 1973 on average, each customer in Britain consumed 3850 (KwH) of electricity; domestic users were responsible for over half of the United Kingdom's electricity consumption. This was the highest since previous energy restrictions in the United Kingdom and meant that during the 1974 three-day week, the home became the centre of energy politics.[31] As this chapter will demonstrate, the energy crisis and three-day week was a 'turning point' within energy policy debates globally (Figueroa, 2013) - causing a shift in the way energy was considered within government debates. This 'vibrant matter' (Bennett, 2009) changed how energy was viewed within the home and introduced the need for a reduction in energy demand to the public.

Within popular rhetoric, the 1970s are the decade of the 'lights going out' (Beckett, 2010). Often in historical accounts of this period, there has been confusion around what was happening and why, as political commentators focused on issues most pertinent to them and newspapers sided with their political allegiances. Even one of the most comprehensive accounts of 1974 by social historian Alwyn Turner illustrates the energy crisis of 1974 with an image from 1972.[32] John Burton's diary entry presents the nuances of the period in a way that is hard to convey today. This is perhaps due to the nature of the political events in the 1970s, 'strange times' (Wheen, 2010) that saw the end of post-war prosperity but additionally the beginning of a new relationship between the public, the state and infrastructure. 'The worst crisis [Britain] faced since 1931 and the 'biggest test of democracy since 1940' played a part in the 'wholesale political economic shift' in the processes of urban and infrastructure

[31] AGB Home Audit Ownership Reports March 1973-June 1973 Museum of Science and Industry Manchester (MOSI)
[32] Cf. Turner, Alwyn. Crisis? What Crisis? (Abacus: London, 2010) and http://www.gettyimages.co.uk/license/3092818 Hulton Archive Credit: Ian Showell / Stringer Editorial #: 3092818 Collection: Hulton Archive Date created: 11 February, 1972

development (Graham and Marvin, 2001: 95). Information about the period has often been remembered incorrectly and thus become a rhetorical device used by politicians on both left and right leaning sides of the political spectrum. Strikes and a snap election in February 1974 resulted in the era being subject to 'false memory syndrome, reinforced by present day political rhetoric and 'spin' (Black and Pemberton, 2010). The threat of the power cut was emphasised by measures imposed on the public both in work and leisure to create 'significant economies in electricity consumption'.[33] This chapter reconstructs this history through the examination of government documents, press releases, newspaper articles, newsreels, public information films, and other ephemeral material, which allows for an accurate picture of the impact of the threat of power cuts to be seen and not to allow nostalgia to come through. This chapter focuses on what happened within everyday life, rather than the grand narratives of Miner vs. Government and OPEC vs. Government that were in place at the time. This shift of focus offers a new perspective on an event that has been overshadowed by the political agendas of those with and without power.

The electrical grid of 1974 was not only the work of agents such as miners, politicians and oil fields, but was additionally a mixture of publics, the welfare state, coal mines, power stations, wires, homes, engineers, technicians, light, generators to name but a few nodes of the network. As detailed in the methodology (Chapter Three), visibility is not only a key theme of empirical research in this thesis but additionally the historical research has at points highlighted the invisibility of certain actors. For those who experienced the 'power cuts' in 1974, they were not a rare occurrence that they are perceived to be today (Aylott, Jones and Black, 2015). Yet, in official archives of various institutions – information about what happened within the sphere of 'crisis' has been hard to find. The 'three-day week' of 1974 provides a case study by which themes of social order can be highlighted by what Shove has called an 'analysis of sociotechnical co-evolution' (2003, 79). However, whereas Shove has used case studies focusing on energy demand and practises on a small scale, such as the washing machine, this chapter takes a large technical system, the electricity network (Hughes:1983) and considers the symbiotic and mobile relationship between physical and

[33] Sir Peter Menzies Correspondence 1973 MOSI 1989.338/ 369 Pas 25/1

social power to demonstrate how the public is embedded within infrastructure. This chapter will look back to the effects on and restructuring of daily practices during this period of 'crisis', to illustrate the nature of the threat of power cuts on everyday life. It will consider the processes through which the crisis and threat of power cuts was discursively constructed. First by examining in detail the ways in which the public responded to the threat of a power cut, then move onto a discussion of leisure practices during this time. To understand the suspension of time that occurred in this moment of disruption, football and television are used as examples of leisure practices that were affected by power cuts. It will then provide an analysis of the government campaign put in place to prevent power cuts and finally highlight how this gave way to a new way of presenting information about the nature of energy and the electricity grid to consumers and a new possible future for Britain.

4.2 'The Suffering of the Public'[34]

> 'There is no petrol, no electricity, no gas and no coal. The factory where Arnold works has closed down, and his children are at home, because their school is too cold'.[35]

On 2nd January 1974, the BBC's *Midweek* current affairs programme broadcast a sketch detailing the effects of the crisis on the general public with the characters Arnold Boulting and his wife representing the 'average' family in Britain. Factories were no longer operating; schools were closed due to heating restrictions and as the feature went on to demonstrate – these issues were now in the home as well, 'Mrs Boulting now boils her weekly wash over a cauldron heated by a wood fire. As she stirs it, she moans about the appallingly high cost of food'. The feature closed with the emotions of the events 'the Boulting family are sunk in gloom'. Although a fictional family, the programme used the sketch as a demonstration of the impact restrictions on electricity were having on ordinary people.

[34] Lancashire County Archives DDX 2952/1/9

[35] BBC *Midweek*, January 2 1974, British Film Institute, 781321.

Domestic customers were asked to restrict use of electricity to one room.[36] The Minister for Energy Patrick Jenkins urged the public to 'brush their teeth in the dark'.[37] Many began to view home activities as being dictated to them by the state, 'washing up by hand (pace Mrs Patrick Jenkins).[38] Despite only 41 per cent of homes owning an electric cooker and 5.8 per cent a freezer, everyone in Britain was to feel the effects of the crisis.[39] In a 'country of chaos', the threat of widespread and unpredictable disconnections by mid- January meant that drastic savings in electricity were vital to get through the winter.[40] Government officials proposed to achieve this by restricting industry and commerce to three days electricity a week 'we dare not assume the best or anything like it. If we do, and are wrong, the consequences are so serious as to be unacceptable.[41] Without imposed electricity restrictions, the power stations would have run out of coal by January 21 and would therefore be unable to maintain production. This would have then led to 'a matter of total shutdown' with only enough power left for the inner ring of essential services, such as water supplies and sewage, and as *The Times* noted, even constant power for these was uncertain.[42]

The striking of Big Ben at midnight on 1st January 1974 may not have been the start of the crisis, but the New Year signalled the beginning of the 'three-day week' in Britain and the country began to work on restricted time. All businesses and those deemed *'essential to the life of the country'* would receive power for only three days a week. Non-essential shops would only have power for half of each day.[43] For many in Britain, the start of a New Year would be spent thinking of resolutions and the year ahead. However, as the Christmas number one record played on the nation's radios with the lyrics '*look to the future now, it's only just begun',* the future itself was looking different to how the public could have imagined

[36] Energy Crisis. December 14 1973. *The Guardian,* p. 10.

[37] Mr Jenkin's Toothbrush Blackout, *The Times* (London, England), Thursday, Jan 17, 1974; p. 13

[38] Allen, Margaret, *The Times* (London: England) February 11, 1974, p.7.

[39] AGB Home Audit Ownership Reports March-June 1973.

[40] *Daily Mirror*, 12 December 1973, p.5

[41] TNA: PRO, CAB134/3591. 'Electricity Supply – Further Restrictions: Paper by the DTI', CCU 73 107, 10 December 1973.

[42] "The Midwives Of Reality." *The Times* [London, England] 14 Dec. 1973, p.19.

[43] National Archives. Cabinet Conclusion 5. Fuel Restrictions. 13 December 1973.

just a year ago. They were in the midst of two months of crisis and electricity was being used as a bargaining tool.[44] To remove or restrict power from one aspect of the network, such as the actors themselves - politicians, miners, the public and even the power stations, would 'threaten the very fabric of our society'.[45] By cutting electricity supplies from January, the Government felt it was gaining time by which settlements to both the NUM and the oil crisis could become feasible and would 'bring the country nearer to the spring'.[46]

National newspapers resumed publication after the bank holiday break on the 2nd January after a 'harder Christmas than we have known since the war'.[47] Adverts for domestic generators to deal with electricity cuts lined the pages of national newspapers, despite the fuel needed to power them, oil and petrol, being subject to a worldwide shortage.[48] Alternative technologies to electricity were in high demand with the government subsidised promotions still encouraging people to spend on electrical goods. This did not go unnoticed by one member of the public, George Liddiment, who wrote to the Deputy Chairman of the Electricity council. He observed:

> 'After the debacle of the last Miners' strike, one could have thought that the Electricity Council would have been much better prepared to meet the present emergency but obviously have once again been caught with their pants well and truly down.
>
> And why may I ask are the Boards Electricity Shops still selling electrical appliances?'[49]

During the period, the number of letters received by the Electricity Council increased, with members of the public providing not only solutions but informing those responsible about their wrong doings. Lengthy conversations between members of the board and engineers who were not associated with the workings of the council or the Central Electricity Generating Board (CEGB) took place, detailing why power cuts were 'a made-up phenomenon by

[44] TNA: Cabinet minutes 1 March 1974 PRO CAB 128/53

[45] *HC Deb 12 December 1973 vol. 866 cc417-20*

[46] "The Midwives Of Reality." *Times*, p. 19

[47] Edward heath ministerial broadcast, 13 December 1974, BBC.

[48] "Deutz." *The Times* [London, England] 2 January. 1974, p.3.

[49] George. W. Liddiment , Letter to Mr R. Richardson, Electricity council, , 15th December 1973, MOSI 2938 1028

government in order to make money'.[50] Others, such as Mr R Nettley, wrote to the chairman to simply state that the country was 'fed up with industrial anarchy and blackmail' and that the crisis highlighted the incompetence of all nationalised industries.[51]

The sense of crisis that was being constructed by the altering of daily practices resulted in consumers developing their own expertise and knowledge about what they would need and when they would need it. Not everyone wrote letters of complaint to demonstrate this, but for members of the public who 'had a good Christmas and just want to look after themselves in the New Year', this resilience meant panic buying food.[52] In December it had been noted that the threat to supply of groceries was 'critical'.[53] Food manufacturers restricted by the three day working week were unable to produce the targeted amounts of stock.[54] By February even toilet paper was in short supply due to 'widespread panic buying by consumers' and rationing of the product was being considered.[55]

In the *Daily Mirror,* medical professionals warned that a power-cut of just three hours could kill up to 20,000 old people, 'power cuts will kill off thousands. The death rate will soar in cold weather', with the charity Age Concern vocalising this concern as well.[56] The newspaper further emphasised these warnings by publishing two stories about the effects of power cuts on two elderly pensioners.[57] By inviting readers to imagine themselves in these situations, newspapers were directly creating a sense of panic. Instead of presenting strategies for dealing with possible power cuts, newspapers churned up responses to a particular 'side', with circuits of cause and effect being presented. To many, the government were 'once again busy proving that they are the worst readers of popular psychology in the Country'.[58] This suggestion that few people wished to have the restrictions placed upon them, that the

[50] William Ross. MA CEng FIEE, Letter to chairman MOSI 2938 1028
[51] Mr R.W. Nettley Letter to chairman MOSI 2938 1028
[52] "Threat to supply of groceries in New Year." *Times,*[London, England] 17 December 1973, p.4.

[53] *Ibid.*

[54] 603.75 Trade Unions Congress Archive, Modern Records Centre Warwick.

[55] Patricia Tisdall. "Advertising and Marketing." *Times* [London, England] 6 Feb. 1974, p.18

[56] *Daily Mirror*, Monday February 18 1974, p. 8.

[57] *Ibid.*

[58] David Wood, 'When a crisis does not look like a crisis', *Times*, 10 December 1973.

Government was running themselves into a bad press over their handling of the fuel crisis with only themselves to blame, creating further tensions and rifts between different parts of the network.

Alongside the electricity restrictions, petrol rationing was in place.[59] Coupon books were presented to car owners, using the template of motor vehicle rationing books from the Second World War, as well as using surplus stock left over from the conflict.[60] Shadow Minister for Energy, Tony Benn wrote in his diary of his experience of the fifty mile per hour speed limit that had been placed on motorways and main roads in Britain, writing about a trip to Bristol he commented that his trip had taken two and a half hours longer than usual.[61] The novelty of the situation saw newspapers highlight the ways in which people were responding to the restrictions, Figure 8 is one such example– a couple using horses to travel 'bringing a rural touch to an urban road' pictured alongside a contemporary vehicle. Images such as this were accompanied by stories of well-to-do homeowners hoarding tanks of petrol without license to do so.[62]

In order to become more resilient to the changes that a lack of electricity brought – people began to live without it. Britain was required to slow down to be more resilient. Grocery stores such as Safeway wired their lighting to facilitate switching to lower levels.[63] Street lighting dimmed to half its normal brightness[64]. Figure 7 shows some of the measures stores restricted by the policies had to put into place, with oil lamps on shelves in an attempt to bring light into stores. Yet, the dimming of light did not stop shoppers from entering the stores. London's Piccadilly Circus was restricted to only using street lighting due to energy restrictions which prohibited the use of electricity for advertising signs. In Figure 9, an image of Piccadilly Circus during the crisis, there is little lighting and no cars are visible in the image. Although the

[59] *HC Deb 20 December 1973 vol. 866 cc1643-95*

[60] Science Museum, Motor fuel ration book, Serial No LH 553685, 1973 1982-0091_0001

[61] Benn, *Against the Tide,* p. 91.

[62] *The Sun*, **3** January 1974, pg. 6.

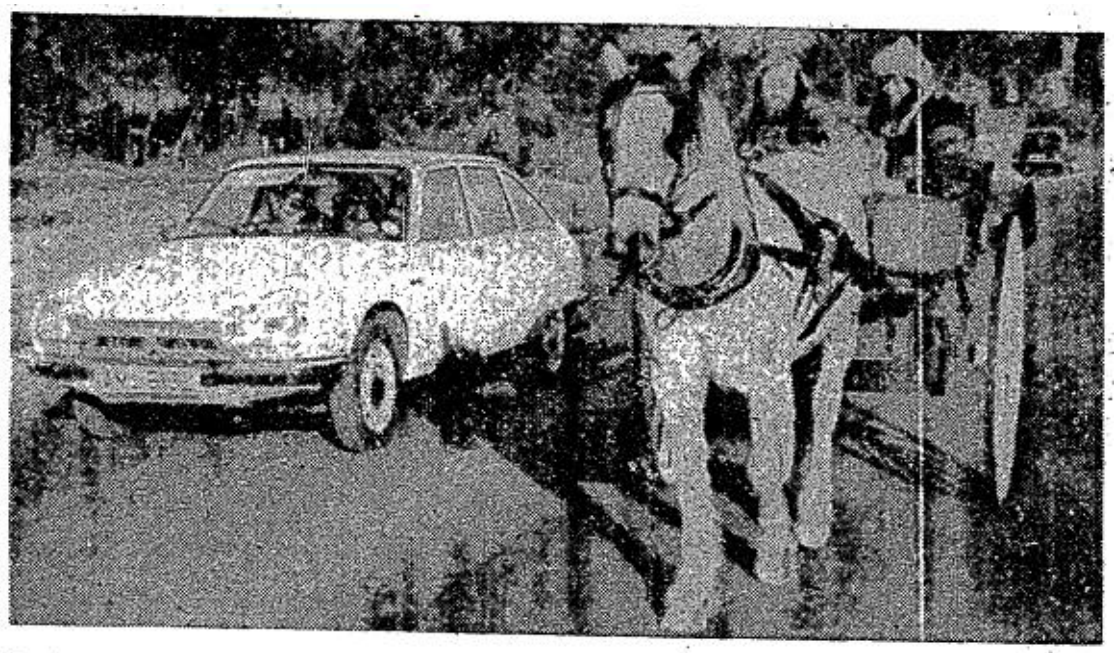
[63] Electricity Council Marketing Department Report, 12th February 1974, MOSI ECO1/02/03/10

[64] TNA: Department of the Environment, 'The Electricity (Lighting) (control) order 1973, PRO AT 55/57, 10 December 1973

photographer of the image for *The Evening Standard* may have intentionally chosen to depict the scene with little traffic for the added effect of the lighting – the petrol restrictions in place as well as the lack of lighting meant that travelling by car at night was not an option available to many. Petrol was in short supply so unnecessary trips were discouraged.

The impact the restrictions had on urban space can be seen in Figure 10, which shows Piccadilly Circus after the restrictions had been lifted. The bright lights of the advertising signs provide more light to the area than the dimmed street lights, the glare of the signs advertising alcoholic drinks dominate the image, as does the number of people who have come to witness the sight. In the previous image no people are visible, as the main attraction of the area was not in use. The roads are full of cars and the image presents a Piccadilly Circus that is part of cultural memory – a busy meeting place. As opposed to the quiet junction that is depicted in Figure 9. The lifting of restrictions appeared to cause the resumption of the expected qualities of spaces and places.

Figure 7: Customers at a London store do their Christmas shopping in semi-darkness during an electricity strike, 20th December 1973. (Source: P Wade/Fox Photos/Hulton Archive/Getty Images)



One-horse power : a Chalfont St Giles, Buckinghamshire, couple bring a rural touch to an urban road.

Figure 8: Customers at a London store do their Christmas shopping in semi-darkness during an electricity strike, 20th December 1973. (Source: P Wade/Fox Photos/Hulton Archive/Getty Images)

Figure 8: Energy Crisis. Times [London, England] 10 Dec. 1973: 5

Figure 9: 3rd December 1973: Unlit advertisements and hardly any traffic at Piccadilly Circus during the fuel crisis. (Photo by Phillips/Fox Photos/Getty Images)

Figure 10: The end of Britain's longest power crisis is post-war history, the lights back on at Piccadilly, Photo by Phillips/Fox Photos/Getty Images

4.3 Leisure in the Dark

> *Whenever I see the letters S.O.S. flash on the TV screen at the start of that power-saving commercial, my mind switches onto a topic that has given me a lot of heartache lately – Soccer on Sunday!'*[65]

Writing in *SHOOT* magazine, a weekly football publication, Liverpool forward Kevin Keegan opened his regular column by recalling his own experiences of 'Switch off Something' (the public information film created during the crisis that is the focus of the next section). Instead of thinking about saving electricity, Keegan reflected on the effects of the power crisis – Sunday Football. Due to the regulations of the 'three-day-week', many factories chose to have Saturday as a working day.[66] Television closedown occurred at 10.30pm and the dimmed streetlights meant that many leisure practices were disrupted and new ideas about time created. For those who had to work at the weekend, the suspension of normal routines meant certain other organisations suffered – and as a 'direct consequence of the power shortages' the Football Association (FA) experimented with football matches on Sundays.[67]

Previously, football had not been played on the Sabbath and playing on the day of rest resulted in religious groups and even the footballers themselves making their issues with the changes well known. The chairman of Burnley FC Bob Lord, who was also Vice President of the League stated 'if it happens I shall get out of football altogether' (Inglis, 1988: 64). Yet, the threat of blackouts provided a space by which to discover whether the public would prefer games on Sundays, as match day audiences were at their lowest since the war, declining 11.3 per cent 1972-73.[68] *The Daily Mail* ran a poll which saw 72 per cent favoured Sunday Football during a power crisis and 60 per cent were 'in favour of professional soccer on Sundays even

[65] Kevin Keegan, *SHOOT! Magazine*, 9 March 1974, p 12.

[66] Bury FC Minutes National Football Museum

[67] TNA: PRO, CAB134/3591. 'Electricity Supply – Further Restrictions: Paper by the DTI', CCU 73 107, 10 December 1973.

[68] Soccer History Issue 17: Autumn 2007, B.376.17 National Football Museum

when there is not power crisis'.[69] Similar to contemporary polls, support for change was strongest within the younger age groups, however out of 1015 interviewees, it was clear that there was some traction for experimentation.

From 14th November 1973 clubs had been unable to use their floodlights for matches, so as the days grew darker, matches were brought forward: 'until further notice all matches must now kick off at 2.00pm'.[70] The ban hit senior clubs with drastic falls in attendances at those matches played mid-week with an afternoon kick off when there was still daylight.[71] The FA viewed the emergency measures taken by the government at the end of November as being 'particularly harsh towards football', writing in the Football Association News that 'it is pertinent, therefore to ask why it is that football should be singled out amongst all the many forms of entertainment which go to make up our leisure time'.[72] The ban on floodlighting applied to all outdoor activities, yet in reality, apart from Rugby league, it was football, and in particular senior football, which was most impacted upon.

> 'Why is it for instance that ice-hockey, indoor bowling, theatres, and cinemas and pubs, which rely almost entirely upon electricity for heating and lighting, should be allowed to continue with minimal interference. Whilst it might appear invidious to make a comparison with street lighting the fact remains that full street lighting was allowed to continue for several weeks before government intervention'.[73]

As with the letters to the Electricity Council, the restrictions placed on Football caused the FA to use their own structures of knowledge to decipher not only the causes but additionally emphasise how the methods used to ease the situation were unjust. After detailing the amount of electricity required to stage a football match under floodlights the head of the FA wondered 'whether the saving of electricity really had any great bearing on the overall

[69] *The Daily Mail*, 10 December 1973.

[70] 'Letter to all clubs' 14 December 1973, Bury FC Minutes, National Football Museum

[71] Preston North End gate receipt book 18 : 12 November 1972 – 9 May 1974

[72] F.A. **'**Football and the Power Crisis', *Football Association News*, Vol 4 Number 1 January 1974.

[73] *Ibid.*

National Picture'.[74] Bury Football club became the soundboard for all the conflicts of Sunday Football, with the unique position of Canon J.R Smith Rector of Bury being a director of the professional football club. He was asked to make his own personal comments to the press with the hope that his position would help harbour support for the changes.[75]

Despite the angst of the FA over the introduction of Sunday football, there was one positive effect. Audiences for Sunday matches were at their highest level since 1972. Preston North End vs. Nottingham Forest had an attendance of 13,436. This remained the highest attendance until 27th April 1974, when longer daylight hours meant matches no longer required earlier kick-offs.[76] The novelty of a Sunday match may have brought in the crowds, yet due to Sunday trading laws, clubs were not allowed to charge for entry. Instead, entry was gained by buying a team sheet or programme that charged the same price as regular admission. Clubs were required to leave one turnstile open for people who did not wish to buy a programme; this was encouraged by those who believed Sunday football was morally wrong. For them, the act of using the turnstile denounced the breaking of the Sabbath.

Although Bob Lord had asked for his strong objections to be recorded in all minutes of the FA, he never resigned; the last Sunday football match of the crisis was played on the 24th March 1974. It was not until February 1981 that the FA officially sanctioned Sunday Football League fixtures and a further two years until FA cup ties were allowed to be played on the Sabbath (Russell, 1997: 151). However, Sunday games that occurred during this time provided a space by which to see how the public responded to a change in leisure practices, not only in a time of crisis – but additionally the introduction of events on a Sunday, traditionally a day of rest. This was not the original intent of the FA when it changed kick-off times and dates, yet the disrupted time of the crisis demonstrated that it was possible to play on a Sunday.

It was not just leisure outside of the home that was affected by the unfolding crisis; practices within the home were also subject to disruption. Reflecting on the energy crisis, George

[74] *Ibid.*

[75] Minutes of meeting, 13 January 1974, Bury FC, National Football Museum

[76] Preston North End Gate Book 18

Galloway remembered; 'I think a lot of babies were born after those power cuts – I do remember, there was a lot more love in the air'.[77] This was a common trope in the media throughout the period. The Daily Mirror stated that there was hope in 'crisis Britain' and that 'Chaos is good for you', stating that less people admitted to mental institutions because of 'more loving' in the home.[78] An increase of birth rate was expected in late 1974, reasons being put down to the occurrence of power cuts and the curtailment of television broadcasting hours.[79] However, findings in 1975 suggested that this was not the case – there had been no increase in births (Cope, 1975).

As well as newspapers, television was central to how the crisis was mediated. News programmes such as *Midweek* provided a factual look at the disruption. Others such as the children's magazine programme *Blue Peter* contained segments about the changing nature of the crisis, suggesting people keep warm by laying newspaper in between blankets 'being in the dark is bad enough – but for old people, being cold is even worse'.[80] Sitcoms allowed the emotions felt by many to be presented on screen in a humorous way. One programme that used the disruption at the heart of its storylines over the period was *Till Death Do Us Part,* written by Johnny Speight, which followed the lives of the Garnett family in the East End of London.

Broadcast on the 23rd January 1974, two weeks into the blackout and the last programme before the 10.30pm closedown, one episode of *Till Death…* was broadcast. Titled 'there's a power cut isn't there', demonstrating how common the idea of a blackout had become.[81] In the episode, the conversation flows from the mother's knee problems to the wages of miners, train drivers and electricity workers. Suddenly everything goes black, the lights go out, the

[77] BBC Four, *Timeshift: Switch off Something, http://www.bbc.co.uk/programmes/b0074sct* [Last Accessed 20/06/2017]

[78] *Daily Mirror*, 21 January 1974, p. 5

[79] *Evening Standard*, December 17 1973, *Guardian* August 13 1974.

[80] Fiddick, Peter**; *The Guardian,* London (UK)** Jan 4 1974, p. 8.

[81] '10pm Wednesday 23 January' BBC Radio Times Genome http://genome.ch.bbc.co.uk/bc915b3f21d6431e8794157b3f0a5fad [last accessed 20/06/17]

television goes off, and 'the streetlights are out, everything'. The characters first thoughts are to find the candles or the torch then they turn to the political rhetoric that was occurring around the blackout off screen, 'only fire in one room…most of us have only got one room. Those of us who have got more than one room can only afford to have one in any one at any one time'.

In order to reduce the demand for electricity it had been proposed to prohibit by the use of electricity for space heating in the home except in one room. The electricity council later viewed this policy as 'harsh, and in practice unenforceable. Neither the police nor the staff of the electricity boards would be satisfactory agents for its enforcement'.[82] By referring to actual policy, and emphasising the real effects of restrictions on the general public, the programme was a space which allowed the threat of power cuts to become part of everyday life – even television programmes focused on it.

An episode of *Are you Being Served,* dealt with the fuel shortages from a commercial perspective. The staff of the Grace Brothers department store used methods to keep themselves warm when the central heating was turned off. "We all have to do what we can to combat this critical crisis," declares the manager Mr Rumbold. "Does that mean we've got to go down the mines?" asked menswear assistant Mr Humphries.[83]

The programmes demonstrated how blackouts had become integrated into everyday life; another January episode of *Till Death Do Us Part* focused on a discussion of strikes and blackouts whilst the family played monopoly. Relatable images were being shown on screen to millions of people in Britain. The storyline of *Till Death* provided a way for millions to try and understand the changes of the era (Schaffer, 2010: 455). The dialogue between characters, flowing from personal issues to the political whilst just carrying on amidst the disruption highlighted the way in which the topic was something that should be discussed, yet was just a part of the everyday.

[82] MOSI ECO1/03/02/01

[83] 'Cold Comfort' *Are You Being Served,* Thurday 21 March 1974, http://genome.ch.bbc.co.uk/schedules/bbcone/london/1974-03-21#at-20.00 [last accessed 20/06/1974]

> 'I had expected to get withdrawal symptoms but what I've actually got is a guilt complex. I mean, I sit there watching the last credits fade, then very happily stab the off-button and find there's still time to talk to someone, or play a record, or just sit around for a bit and still get a reasonably early night'.

This extract from a comment piece in *The Guardian* highlights the changing view of structured time, as forced television close down required those who did not wish to go to bed early to find new activities to pass the time. The adjustment of leisure time was '*a whole new world'.*[84]

4.4 4.4 Switch off Something – NOW!

> 'In the commercial break they gave us that well-known advertisement that urges us to Switch off Something'.[85]

Public information films were commonplace in the 1970s, the decade that is known as 'the golden age of the public information film' (McGahen, 2010), when Government endorsed informational films were often shown on television, sandwiched between programmes and the commercial advertising breaks on ITV. They provided information about a range of topics, from crossing the road *'The Green Cross Code Man'* to '*Keeping Britain Tidy'* with the help of Tufty the Squirrel, these more prominent high production and long running films have received significant attention from scholars for their impact on everyday practices (Moran, 2006). Whereas public information films often focused on a plausible threat, they did not have a sense of urgency. This section will detail the development of the 'Switch off Something – NOW!' campaign (henceforth referred to as S.O.S.) mounted by the Department of Energy and the Electricity Council in January 1974 as an attempt to disseminate information about blackouts and increase visibility of disruption. As legislative action was put in place to achieve the saving required, the Electricity Council prepared to advise their customers how best to help the crisis – the implementation of rota disconnection by the governing body, used 'on

[84] Fiddick, *Guardian*, Jan 4 1974, p.8

[85] Leonard Buckley. "The Liberation of Eileen." *Times* [London, England] January 23 1974, p.13.

the last occasion' during the 1972 NUM Miners' Strike was not possible due to multiple affecting supplies.[86]

96.2 per cent of the population owned a television, so visual campaigns were essential for the dissemination of knowledge reaching a national audience.[87] In a meeting of the Electricity Council Advertising Committee on the 11th December 1973, it was decided that a television campaign 'be mounted urgently with the intention of securing customer cooperation in the present fuel supply crisis by appealing to the peoples' good sense and self- interest'.[88] Many of those present in the meeting felt that it would seem better to start electricity restrictions on a voluntary basis, using a massive advertising campaign warning people that if the results of the voluntary restrictions were not satisfactory, they would face much more severe and much less palatable cuts.[89] The S.O.S campaign is different to other films of the time, which is perhaps why it has not been written about within social history. The National Archives holds the footage of one film, yet the accompanying materials can only be found by going through newspapers from the period, as well as the archives of the electricity council.

The film (Figure 11) begins with the words 'FUEL EMERGENCY' sliding onto the screen, the capitalised white lettering on a blue background is left to speak for itself as the narration only begins after a couple of seconds, when after being shown an initial shot of engineers at work, the strong authoritative tone states 'industry needs power'. The scene changes to a hospital, the viewer is presented with the image of an operating table 'so do hospitals', a nurse and a baby in an incubator, it quickly switches to milk bottles, 'so do essential services'.

Only after being shown the wider infrastructure of Britain does the film change setting to the home, and the image of an electric fire, 'at home you could get by with less'.[90] The shot switches to that of a plug socket with a device connected to it, set on a wall with floral

[86] Special Meeting 11th December 1973. Electricity Council Advertising Committee Papers, MOSI ECO1/03/02/01

[87] AGB Home Audit Ownership Reports March 1973 - June 1973.

[88] MOSI ECO1/03/02/01

[89] NA: Cabinet Conclusion 5. Fuel Restrictions. 13 December 1973. PRO CAB 128/53

[90] *'Switch Off Some Power'* available at http://www.nationalarchives.gov.uk/films/1964to1979/filmpage_switch. [Last accessed 19/06/17].

wallpaper. Above the plug the slogan 'Switch off Some Power' is presented in white text. The unknown narrator tells the audience 'at home you could get by with less, so switch off some power', as a hand appears in the frame and turns off the switch, 'NOW' appears on the screen underneath the plug at the same time as the narrator states the word. The still remains on the screen for four seconds so that the message is clear, power needs to be conserved.

Throughout the film, power is visible. The welder's machines emit a spark, the bright lights of the operating theatre, the brightly lit white of the hospital, the machines; even the plug socket has an indicator light. The perceived connection between light and power is made clear when the hand switches the socket off and the indicator light goes out. Whilst the film's main message remains on screen, there is no sense that power has been removed apart from the lack of light as the device remains plugged in the final shot. As such, the film is less a warning and rather a suggestion, there are no images of what will happen when the power goes. It is encoded with the position that power will always be constant, but only if the public adapt their domestic lives.

The changing and multiple meanings of power were built into the film's production. The S.O.S. campaign was a unique public information film in that it was created with inbuilt flexibility to change the copy emphasis almost on a daily basis, 'edited on an almost day-to-day basis to convey needs of a changing situation'.[91] As such the film uses stock footage that demonstrated the preoccupations and concerns of the government during the crisis, whilst being quickly available and interchangeable. The aforementioned example of the film demonstrates the emphasis on industry, emergency and 'essential' services; the narration can be kept the same whilst changing the nature of the footage. The ambiguous footage does not connect the images to a specific hospital or factory, it could be anywhere in Britain. The final shots could even have been in the home of the viewer.

[91] 'Special Meeting 11th December 1973' Electricity Council Advertising Committee Papers MOSI, ECO1/03/02/01.

Figure 11: Switch off Something, Central Office of Information (Source: The National Archives)

The campaign had two primary objectives. First, it aimed to demonstrate industry's responsible attitude towards conservation of fuel and electricity; secondly to carry responsible attitude through to the point where boards had face to face contact with customers.[92] Whereas advertising agencies and production houses would normally create characters for campaigns, there is no storyline in this film – except the threat of having what is presented removed, a serious peacetime concern. There is no information as to why there is a 'fuel emergency'; instead the short narration simply tells the audience what they needed to do – NOW! Through this campaign causality was framed not as a result of political tensions, but rather electricity was the active force that was isolated as being the creator of a crisis and that the main actor who could have an effect on the system was an individual in their home.

The inbuilt sense of urgency was not the original plan for the film. Initial proposals were viewed as a 'soft sell', with three options being presented to the Electricity council by the advertising group Hobson Bates and Partners Ltd.[93] The original campaign idea was that the campaign would be fronted by two major household names – comedians Eric Morecambe and Ernie Wise.[94] Figure 12, a poster intended for the accompanying print media campaign was one of four proposals presented to the Electricity Council on the 11th December 1973; weeks after the threat of power cuts became central to discussions of energy in Parliament. The headline 'Are you a Power-Mad fool?' above an image of Eric Morecambe messing with the central heating. Ernie wise stands behind him. The tagline reads 'There's a better way of living with electricity'.

[92] Minutes of the one hundred and fifty second meeting, Wednesday 12 December 1973'. Electricity Council, MOSI 1989.338/1/1/2/16.

[93] Electricity Council Advertising Committee, Special Meeting 11th December 1973. MOSI ECO1/03/02/01

[94] *Ibid.*

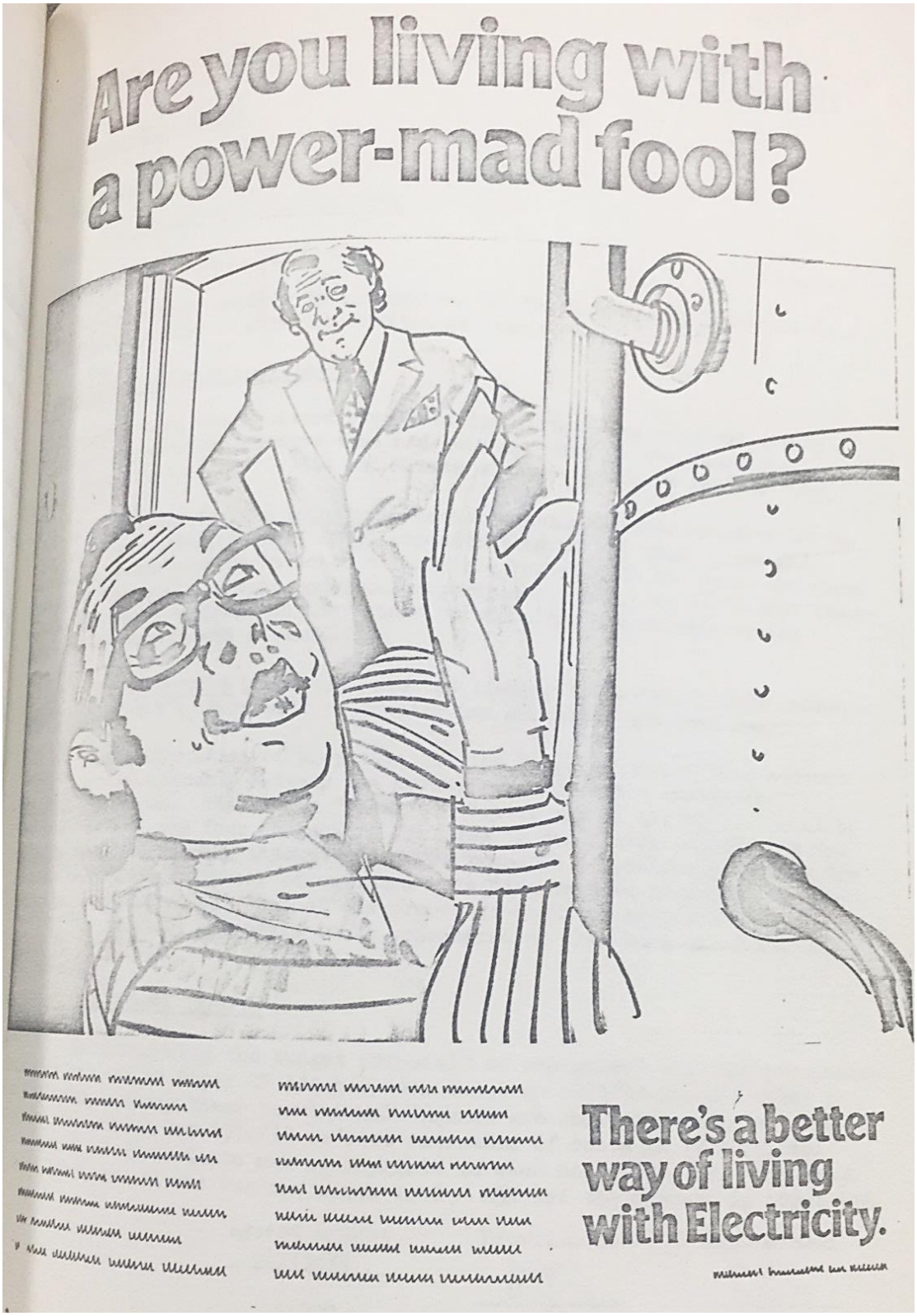


Figure 12: Use Electricity Wisely' - Initial proposal for energy crisis campaign (Source: Electricity Council Archive, Manchester Museum of Science and Industry

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After the initial suggestion in Figure 12, it was proposed that the slogan would be *'save electricity or else…*' offering a stark choice between reasonable economy and great hardship. The commercials intended to identify groups that needed protection, and focus on the continuing need to conserve energy, this is demonstrative in the final S.O.S film. The electricity council decided that the only alternative to the campaign appeared for the industry to abandon national advertising completely for the time being, and to await the outcome of the present emergency. The need to prevent further blackouts presented more simply and starkly in a style quite different from the usual promotional style. It might also be worthwhile putting forward practical methods for energy saving.[95]

The home, the space that could change the nature of the crisis was central to the campaign. Heating was the biggest use of electric power, with only 41% of homes having central heating and 83% of homes owning electric 'direct space' heating.[96] However, despite the campaign hoping to bring home the threat of no power – the campaign did not make everyone happy. Rachel Homer was so enraged by the messages being presented both on screen and in print that she wrote to The Times:

> 'The really infuriating thing about the advertisement, however, is the downright silliness of some of it…Open your fridge and freezer only when necessary we're told. Naturally, I've yet to meet anyone in the habit of leaving the fridge door open.[97]

Rachel, who in the letter titled 'Do they think we are stupid?' describes herself as a housewife, builds on the points of the advertising campaigns seen in the press (such as Figure 13). She notes that the points do not take into consideration the attitudes towards electricity consumption that already exist. She also writes that useful tips have been omitted – such as waiting until food is cold before putting it in the fridge. Once again, the 'scientific knowledge' represented in the campaigns was viewed as insufficient and incorrect – 'what sort of women had the writer in mind?' – Only the homeowner knew what worked best in the situation.

[95] Wednesday 12 December 1973, Electricity Council, MOSI 1989.338/1/1/2/16
[96] AGB Home Audit Ownership reports 1973
[97] Homer, Rachel *The Times* (London, England) Monday Feb 04 1974, p.8

Another letter in *The Guardian* highlighted that the country and many members of it had lived through a greater crisis – the Second World War and so were already equipped with the tools to deal with restrictions.[98]

The Electricity Council's home economist spoke on the radio informing 'these sort of women' how best to deal with the crisis. Mrs Conacher, the Electricity Council Managing Department's Home Economist, broadcast on national radio and television programmes, giving advice and answering questions on domestic problems during the emergency.[99] Emphasising how to prevent and withstand the threat of a power cut may have been viewed as condescending by some such as Rachel Homer, but the campaigns allowed the government to conserve power helped.

Unlike the panic and suffering being propagated by the press, the communications created for television, radio and print media were neutral. They reflected state policy without highlighting the causes and therefore provided a platform which created ways to deal with the crisis – rather than place further blame on the miners, the oil crisis or the government administration. £1.7 million was spent on energy crisis advertising and the S.O.S. campaign from 16 November to 6 February.[100] This is equivalent to £13 million in today's money.[101] 'Appealing to the peoples' good sense and self- interest' had a great effect on the reduction of electricity consumption; savings of 20% (the target figure) were eventually achieved in February.[102] Decreased consumption continued until the end of the energy crisis due to the increase in understanding of the economies that the individual could make to prevent the loss of power.

[98] RUTH M. WATTS, Bathroom black-out *The Times* (London, England), Saturday, Jan 19, 1974; p. 13

[99] MOSI ECO1/02/03/10

[100] Research committee papers, Electricity Council, April 1973-March 1974 MOSI 1989.338/1/1/4/9/13

[101] http://www.nationalarchives.gov.uk/currency-converter/#currency-result

[102] MOSI 1989.338/1/1/2/16

Switching Off Something really helps

Nearly half of our electricity is normally used in the home. This is why the savings everyone has been making are so important for industry and essential services. So don't ease up. Here are some examples of how switching off something really helps.

DIESEL ENGINES

To complete 1,200 tractor engines a day on this assembly line, we need . . .

20 storage radiators switched off for a week,

Or 440 families doing without their fan heaters for an evening,

Or 4,400 lights switched off for an evening.

FOOD PROCESSING

To provide enough electricity to run this canning line for an hour, we need . . .

400 lights switched off for an evening,

Or 80 housewives doing one less machine wash a week,

Or 40 families to switch off a bar of an electric fire for an evening.

FREIGHT DISTRIBUTION

To use this crane to load 100 container lorries, we need . . .

95 families not using their bathroom wall-fires for a week,

Or 160 people to switch off a radiator for an evening,

Or 2,000 lights switched off for an evening.

Switch Off Something–don't ease up.

Issued by the Department of Energy

Figure 13: Switching off Something Really Helps

4.5 Don't want this in the future? Use Electricity *Wisely.*

> 'There is a general need to educate the public at large about the energy consumed and wasted in the home'.[103]

The energy crisis was a turning point for the way energy was viewed. All facets of the production, mediation and consumption were put under scrutiny and forced to change due to the disruption. The three-day week ended on the 31st March 1974, yet the changing nature of practices that occurred during the time did not disappear. Sunday football matches stopped and television played on past 10.30pm, yet the changing consumption habits and the need to reduce electricity demand remained a pertinent issue that required government intervention. Although there was now no perceived immediate threat that required an extreme 'S.O.S'. campaign, the nature of electricity had changed. As recent as 1973, Electricity board shops had pushed for a future that was all-electric and always running, offering grants to those who wished to install electric heaters into their homes, but in April 1974 this was not the plausible future it had once been.

Fears were voiced in the House of Lords about the future of all electric homes and the government grants provided to home owners to modernise. At the beginning of the crisis, Baroness Stocks spoke to the House about those being in such homes and high-rise flats being vulnerable to unpredictable power cuts 'all-electric for cooking, lifts, lighting and everything. When one considers what would happen to them during a blackout it is rather terrifying'.[104] What once had been an option which people had wished for was now something that could make people vulnerable.

During the three-day week, three million leaflets titled 'Better Ways of Using Electricity' were written, printed, and despatched in seven days from 12th February 1974 and delivery

[103] Research committee papers EC April 1973-Mar 1974 MOSI 1989.338/1/1/4/9/13
[104] *HL Deb 17 December 1973 vol. 348 cc3-5*

completed to Board shops in a further seven days. [105] The bi-fold four-page leaflet (Figure 14) listed the various ways homeowners could save electricity. Underneath the bold blue font of the title on the cover of the booklet read: Please save more fuel **now**…if you don't, Power Cuts could soon be happening for hours on end. **HELP US TO HELP YOURSELVES**. The bold font of 'now' emphasised the need for change to happen immediately to prevent the threat to power. Within energy policy, the leaflet is the material point of change from a country where electricity board shops promoted the use of electricity, with area boards promoting high-cost appliances such as fridge-freezers, to a policy of saving electricity. The leaflet is the first that was provided to electricity shop staff to educate the public about how electricity was not to be taken for granted. **'Help us to Help Yourselves'** had echoes of wartime slogans to help the war effort, 'us' being the wider community which benefitted from an individual's actions. In 1974, the 'war' that was being played out was a case of consumption vs. production.

Along the bottom of the front cover, is the message 'By keeping in most of the heat you pay for, you will be making BETTER USE OF ELECTRICITY'. The leaflet goes on to state 'when at work – you can save fuel by reducing lighting and heating' as well as home improvements, such as insulation. The final page once again demonstrates the change in the electricity council's attitude to electricity, 'your electricity board shop is there to help you and will be able to give you up-to-date information'. Previously the shops main role had been to sell goods, not help use less power. The final message 'IF WE EACH SAVE A LITTLE, WE'LL ALL SAVE A LOT', again reflects the nature of community and the duty of the individual to conserve energy and prevent future disruption.

'A better way of living with electricity' had been used as a slogan throughout the Electricity Council's marketing materials for electricity board shops in the early 1970s.[106] In 1973 messages such as 'YOUR home can be modernised with the help of electricity to make it a

[105] February 12 1974 Marketing Department report, Electricity Council Standing Committee Papers MOSI ECO1/02/03/10

[106] 'A Better way of Living with Electricity' electric oven marketing leaflet, August 1973, MOSI EC.3115

better, happier place to live in – and more valuable' were printed in every leaflet handed out in store.[107]

The energy crisis signalled the shift from using the slogan to promote goods and increased electrical consumption to promoting the need for conservation measures. The future of energy sales was additionally impacted by the development of the conservationist lobby. The need to reduce electricity was viewed as an ecological requirement by many who viewed future populations as being under threat. Meetings were held across the country during the winter. In Manchester, the Conservationist Society held a meeting to provide an alternative understanding of the energy crisis, to members of the public who may have felt that the government line of 'switching off something' was not enough.[108]

After the worst of the crisis and winter was over, this belief was also held by the Electricity Council, as well as 'the important relationship between higher room temperatures and higher fuel bills' demonstrated in the Better Ways of Living with Electricity leaflet.[109] Additionally, measures put forward included the provision of clear rating places giving both energy consumption and simple information from which running costs can be calculated on all domestic appliances including cookers, washing machines, deep freezers, and television sets. This is still in place today.[110]

A Government enquiry into energy conservation, published in July 1974, emphasised the vulnerability of the UK's energy intensive economy. It 'highlighted the need to minimise the impact of possible future disruptions, emphasised the value of our reserves of North Sea oil and natural gas and brought into sharper focus the importance of UK coal and nuclear power'.[111] By September of the same year, every electricity council leaflet was printed with a new slogan – 'Use electricity Wisely'.[112] The slogan that had formed part of a failed

[107] 'Modernise with Electricity' Leaflet, Electricity Council, 1973, MOSI EC.3078

[108] 'Energy Crisis Meeting', Manchester Library Archive ,GB127.Broadsides/F1973.58

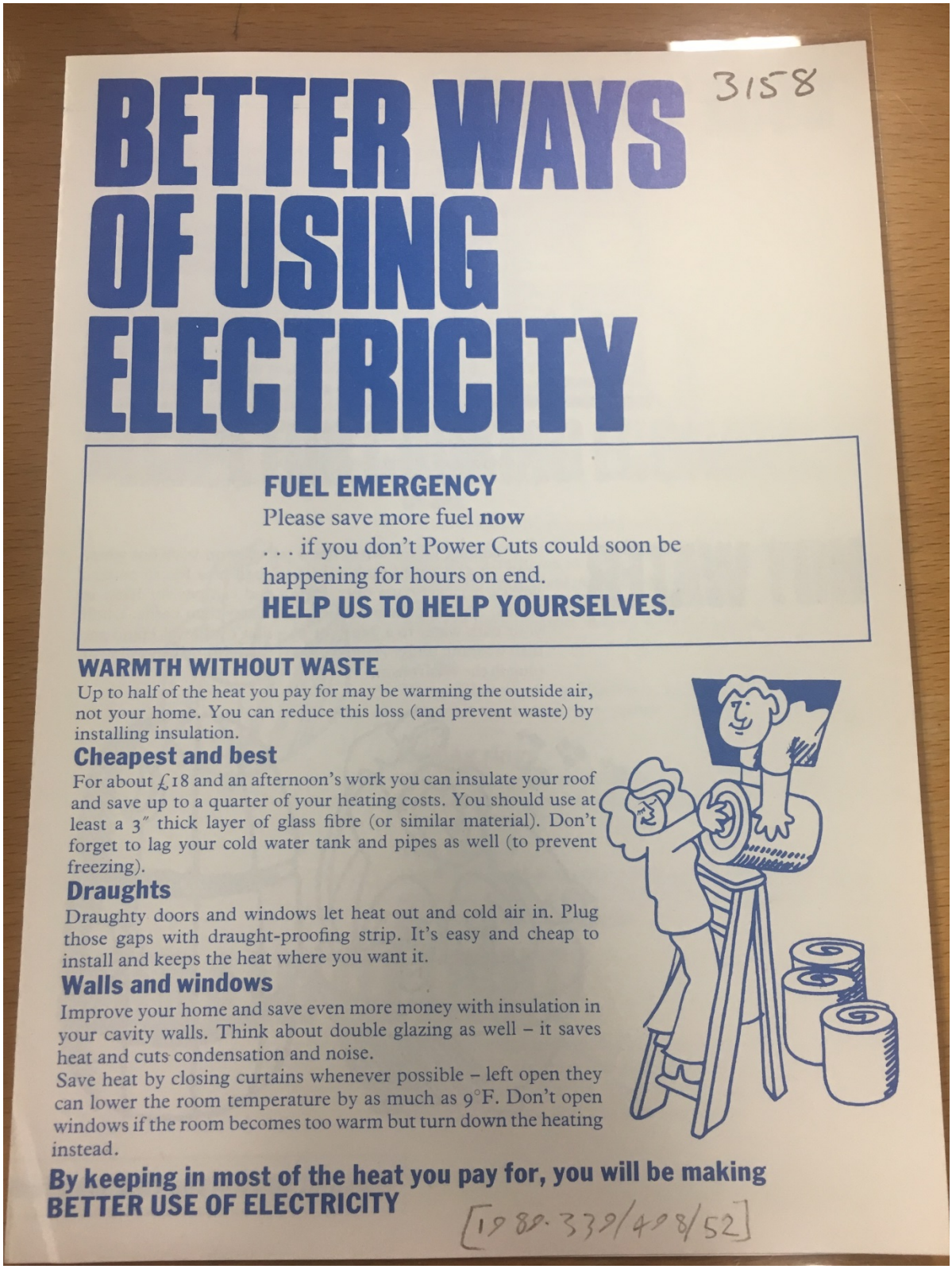
[109] Electricity Council Research Committee papers, April 1973-Mar 1974, MOSI 1989.338/1/1/4/9/13.
[110] *Ibid.*
[111] *Energy Conservation: A Study by Central Policy Review Staff, July 1974* Electricity Council Research Committee Papers April 1973-March 1974, MOSI 1989.338/1/1/4/9/13.
[112] *The Electric Comfort Book*, September 1974, MOSI EC 3188

promotional campaign during the energy crisis was no longer associated with Morecambe and Wise; instead a small cartoon image of an owl accompanied the phrase on the back of publicity materials.

The Electric Comfort Book published in September 1974 was one of the new leaflets created to educate the public about unpredictable electricity supplies and how to become more resilient.[113] **'**Everything you need to know about warmth without waste', the information booklet listed the different types of electric heating and hot water systems available with an emphasis on insulation. 'If you were previously unaware of the importance of lighting – the recent severe restrictions must by now have brought it home'.[114] The owl logo is present on front and back covers of the leaflet as well as information about the need to 'start planning now for next winter', being prepared for future disruption was now inherent within the policy of those responsible for electricity supply chain 'we cannot afford to waste this increasingly valuable resource' and they hoped to inform the public with the knowledge that would enable them to become more resilient in the future. Thought had shifted from associating time and electricity with buying things for special occasions or to modernise the home to planning for seasons and what may occur in the months and years to come.

[113] *Ibid.*

[114] *Ibid.*



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BETTER WAYS OF USING ELECTRICITY

FUEL EMERGENCY

Please save more fuel **now**

. . . if you don't Power Cuts could soon be happening for hours on end.

HELP US TO HELP YOURSELVES.

WARMTH WITHOUT WASTE

Up to half of the heat you pay for may be warming the outside air, not your home. You can reduce this loss (and prevent waste) by installing insulation.

Cheapest and best

For about £18 and an afternoon's work you can insulate your roof and save up to a quarter of your heating costs. You should use at least a 3″ thick layer of glass fibre (or similar material). Don't forget to lag your cold water tank and pipes as well (to prevent freezing).

Draughts

Draughty doors and windows let heat out and cold air in. Plug those gaps with draught-proofing strip. It's easy and cheap to install and keeps the heat where you want it.

Walls and windows

Improve your home and save even more money with insulation in your cavity walls. Think about double glazing as well – it saves heat and cuts condensation and noise.

Save heat by closing curtains whenever possible – left open they can lower the room temperature by as much as 9°F. Don't open windows if the room becomes too warm but turn down the heating instead.

By keeping in most of the heat you pay for, you will be making BETTER USE OF ELECTRICITY

[1980.339/498/52]

Figure 14: Better Ways of Using Electricity Leaflet (MOSI)

4.6 Conclusion

> 'It is characteristic of most crises that they are the point at which reality breaks through illusion. As such they are usually very painful, and in their immediate effects very damaging as it would be to continue to live with one's illusions. These crises are precisely of this character; they are very unpleasant, but because they are the midwives of reality they are essentially benign'.[115]

In early 1974 Britain was going through social, economic and political upheaval. This was a time of energy 'crisis', in production, mediation and consumption. The need to focus on the material aspects of the crisis such as energy saw the Prime Minister become detached from the political aspects of the crisis, confidence reached its limit and as Douglas Hurd noted in his autobiography, the government 'would increasingly be felt to be out of touch with reality'.[116] After the snap election of February 1974, Harold Wilson became prime minister with a minority government. The crisis highlighted not only the present, but gave birth to a new future, although this was perceived by many to be a painful moment of change and disruption.

The three-day week of 1974 is remembered as the time of crisis and breakdown due to the threat being presented to the general public in all forms of communication, radio, television and the press. As this chapter has detailed, the events of the energy crisis in 1974 had a great impact on the day-to-day workings of the country but this was encapsulated by television broadcasts, the impact on leisure activities and the changing nature of people's home lives due to the restrictions. In the disrupted space of the energy crisis and the three-day week, time was suspended in various ways. Television 'closed down' earlier than usual, Sundays became a day of leisure rather than rest and the panic that occurred from the disruption

[115] "The Midwives Of Reality." *Times* 14 December 1973: 19.

[116] Douglas Hurd, *An End to Promises: Sketch of a Government 1970-1974* (Harper Collins: London, 1979), pp.118-9.

caused the public to act differently to how they would during a time when the threat of power cuts was not constant. The three-day week of 1974 highlighted the changing future of Britain and the need for publics to incorporate threat to their daily lives into daily practices. This would suggest that these lessons would be incorporated into the everyday after the event, they were soon forgotten when oil, gas and coal began to flow again after the energy crisis.

Whereas a power cut on a local level provides a case study from which individual voices can be seen, viewing the events of 1974 from a national level – as this chapter has demonstrated - has allowed for an image of how the constant threat of large –scale power cuts played out. As the next chapter will detail (Chapter Six), when a blackout occurred to a small city 41 years later, the sense of panic, constructions of knowledge and visibility of power that was present during the event, again demonstrated the capability of crises to galvanise action, a sense of collective experience and – albeit temporary – sense of collective responsibility, capability for change, the speed of change, the sense of alternative futures.

Throughout the chapter the sense of crisis has been referenced as being similar to the emotions and practises of the Second World War. From the ration coupons to the need to change individual actions for the greater good of the country, the rhetoric has been one that not only provided solace to some people during the situation, but additionally it highlights the way in which memory is vital for understanding disrupted moments of time. This will be explored in Chapter Six ‘maintaining the future’, and will demonstrate how Social Futures are constructed through maintenance of the knowledge that has come before.

5. The Visibility of Power

5.1 Lancaster 2015

On 5th December 2015 at 10.30pm Lancaster lost power; electricity was not fully restored for a week. This was the most widespread loss of power in North West England since the Carlisle floods of 2003. The storm knocked out the electrical power supply for 60,000 homes, and consequently disrupted communication and transport infrastructures; the outage across the city happened simultaneously, creating 'chaos' (Lancaster Guardian, 7 December 2015).

This chapter builds upon Frank Trentmann's work on electrical blackouts as a space which illuminates the nature of everyday life (2009). By recounting what happened during the blackout through interviews as well as social media posts from the period of the event, this section creates a detailed image of the social impact of disruption on infrastructure, a critical dimension that is often neglected in accounts (Nye's 2010 work and Trentmann are both an exception). Knowledge of system breakdown is vital to understanding the material world as 'tenuous and fragile, one that involves a lot of energy, maintenance and adjustments from consumers' (Trentmann, 2009). The disruption that occurred in Lancaster demonstrates not only the transient and dynamic stability of the network, but also the pressures and adjustments that are needed for everyday life to continue.

Not all disruptions are as dramatic and long lasting as the Lancaster blackout; storms in 2013 saw nearly one million customers lose power for three minutes, and almost 16,000 without power for 48 hours.[117] In the Western World, a continuous supply of electricity is assumed. The impact of Lancaster's power outage, as a result of Storm Desmond, is important as it demonstrates the ways in which people respond to an event which is not routine, and

[117] https://www.ofgem.gov.uk/publications-and-updates/december-2013-storms-review-%E2%80%93-impact-electricity-distribution-customers

seemingly appears out of nowhere. The flooding of the substation by the River Lune in Lancaster was viewed as a once in 100-year event.[118] Yet, Storm Desmond occurred only three years after this report. By looking at the Storm Desmond blackout, insight can be gained into what people do and think when their presents are disrupted for long enough to disrupt the rhythms of everyday life.

Whereas the previous chapters have addressed the development of the system as well as the embeddedness of the public within infrastructure, this chapter looks at another 'revelatory moment'. Looking at the disruption to electrical power caused by Storm Desmond, it will first 'reconstruct' the event using data analysis, first-hand interviews, newspaper reports and social media posts. Next it will look at how the boundaries of power, demonstrate how disruption created new insides and outsides, considering how knowledge is situated within these new environments. It will then move to a discussion of visibility, working with the idea of absence to demonstrate that moments such as the blackout that occurred in Lancaster highlight how publics who are not directly involved in its maintenance are able to see infrastructure processes. The removal of technologies during the event is one of the key aspects which participants have drawn on to understand disruption. The lack of electricity caused two main descriptors: a primal 'back to basics' way of life, or the view that this is the 'apocalypse' and the end of the world. The final section will assess these understandings in relation to modernity and the disembodiment people felt because electricity was seemingly 'invisible'.

Online, there are few photographs available that focus on the blackout during Storm Desmond. Digital camera technologies could not be charged, and from an auto-ethnographic perspective as someone who was in Lancaster during this event, the scramble to document what was going on, whilst trying to obtain information meant I sought to use technology on the spot. However, this was without initially understanding 'how much charge' I had left in my phone, leading to the removal of photography as a medium by which to capture the event.

[118] https://www.theguardian.com/uk-news/2015/dec/07/britain-flood-defences-storm-desmond-fit-for-purpose

There are however, a few photographs (such as figure 15) available on social media. They are images of the city without power, highlighting the lack of lighting – the darkness created. This is why a narrative approach to understanding what happened during the blackout has been employed in this chapter, as the aesthetics of invisibility are such that removing light affected the ability to comprehend the visual dimensions of the event. All that was visible was darkness. In many ways 'before and during' images allow for a counter-reality to be created, that this absence of power was an 'apocalypse'. Agency was unable to be attributed to one actor or set of actors, and so the idea that this was a disrupted space to which great damage had occurred endured.

Figure 15 shows before and after views across the river, to Millennium Bridge and domestic housing estates. The illuminated square in the middle is a converted old bus depot where the amenities are powered solely by electricity. The before image glows with not only the streetlights, but also the headlights of the car light the scene. In the second image, after power has gone, the car is all that is visible. The vehicle's presence suggests that all has not stopped, yet we do not know what is going on in the darkness. The before and after images when seen together clearly indicate something is not right. The built environment beyond the river demonstrates the human effect on the landscape, the image supplies evidence for the viewer and the photographer that the power has gone for a significant amount of people in the city. Viewing the city in this way is an assurance for the person capturing the moment, they are not the only ones affected. The darkness is a symbolic and iconographic indicator of a disrupted scene of everyday life.

Through a narrative approach this chapter will illuminate the projection of ideas and the imagination within a disrupted environment. Photographs such as these transform the city into something unbelievable. Lancaster became a text that was able to be read by engineers, planners, the media and the community.

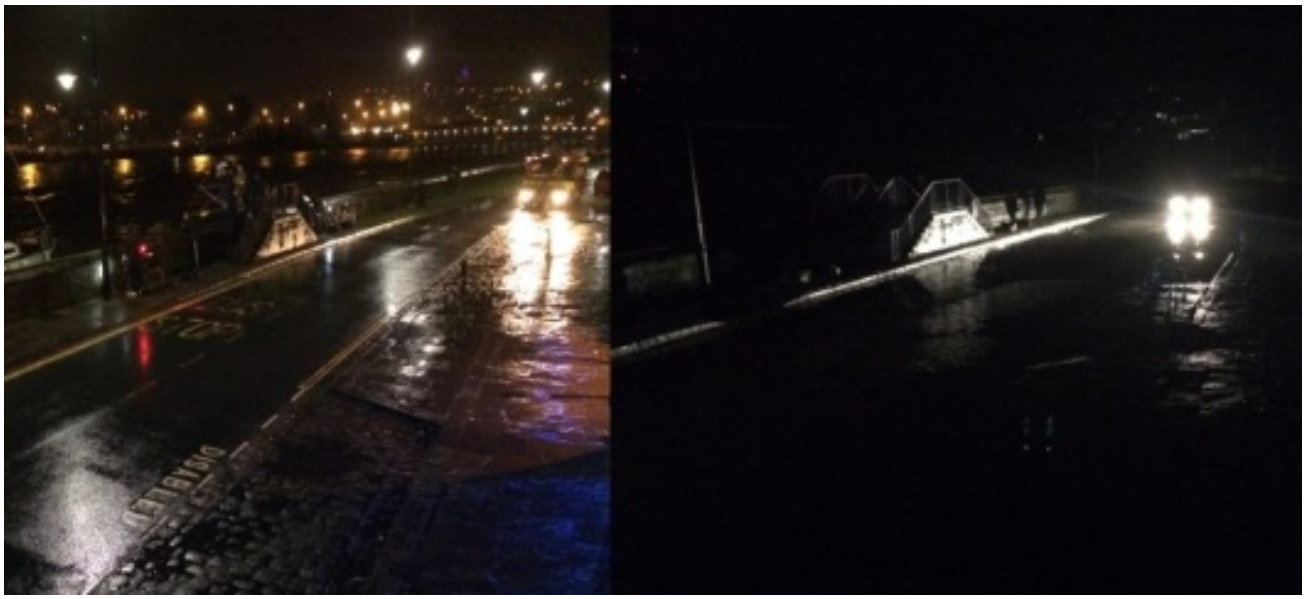

Figure 15: Before and during the blackout (Image courtesy of the Bay Radio)

With and without power, the images beside each other demonstrate the novelty of the blackout. They show the invisible component of landscapes (Burkner, 2014) marking the dichotomy between what we perceive power to be (keeping the lights on) and the lived experience of power (comfort and extended range of activities). Through photography, the idea that having power is about 'having the lights on' is demonstrated. Although a basic visual strategy for knowing if power was restored the images cannot visualise the process and workings of the disrupted city. The threat of further disruption remains invisible without outside forces. We cannot see the substation that flooded; we can however see the street lights that have turned off. Often the perceived cultural meaning of having no power (as demonstrated in Chapter 3 and the discussion of past energy disruption), is the presence of light. When power was restored to the city, friends and family outside of Lancaster contacted me asking, 'have the lights come back on?'

When considering electrical blackouts, Lancaster is a unique example as the communications networks were knocked out, not just domestic electricity. As a result of the longevity and scope of the event, the blackout has since gained attention from engineers, planners and communities demonstrating the significance of a landscape transformed. In May 2016, the Institute for Engineering published a report, titled 'Living without Electricity', highlighting the extent of the impact to infrastructure. However, written from an engineering perspective and

engaging with various actors, it does not consider the nature of resilience and how 'ordinary' people coped during the event. This chapter not only assesses *what* happened to the community, but how electricity became a material and visual presence – through its invisibility.

There is one key aspect of Storm Desmond that needs to be addressed – the flooding. This could be viewed as the automatic response to why there are few images of Lancaster during this time, the city did not suffer as much disruption as places such as Kendal, people were not flooded out of their homes as they were in places further north. Water is both a material and visible substance (Strang, 2004) we can instantly see the effects of a flood; it can easily be captured in a photograph. However, this thesis seeks to look at the moments of disruption which cause a momentary fracture of everyday life. These smaller, localised moments of disruption deserve to be studied; they are a 'zone' that highlights the overlooked elements of infrastructure disruption – how people perceive, visualise and understand power.

5.2 The Blackout

The night that the blackout happened, one participant of this study, Susan, a charity worker who lives in Warton, five miles away from the city centre, was watching the television;

> 'We had just been watching *X Factor*…the lights and everything just went out. At first we thought it was a short-term thing… we just went to bed and thought it would be on in the morning'.

Jim, an undergraduate student at Lancaster University, also shared this belief; after the power went everyone in his house '*went to bed and just assumed it would be on in the morning*'. The belief that normality would resume demonstrates the way in which the blackout was initially viewed, a momentary fault and an issue that would be resolved quickly, with little effect on the individual.

The blackout began during the weekend, and the activities that were being undertaken by residents of Lancaster were varied, '*we were playing games in the living room'*, another participant '*I'd just been out for a meal with my flat, came home and all of a sudden the power went out', another 'I was cooking and my food was ruined'*, or even '*I had just broken up with my boyfriend*'**;** they all noticed when the blackout happened. With many, such as Susan, being able to remember the exact time it occurred '*it was a Saturday night, it happened at about 20 to 11'.*

The knowledge of when there was no electricity was aided by social practice and technologies, be that televisions, lights or the oven going off. The moment everything stopped is one that is remembered, as electricity was a vital actor within the evening routines of those in Lancaster at the moment of initial blackout. The blackout opens up a conversation about time. Nye argues that 'blackouts' are carved out of the normal flow of time, a social experience creating 'a new kind of social space' (2010). Nye's work focuses on the prevention of work activities due to blackouts, which 'blackout breaks with modern, capitalist, productive time, and with the simultaneity of electrical systems. If accelerated time is money, then the timelessness of a blackout uncovers non-monetary values and other uses of space.

If the blackout in Lancaster had started during the day, on a weekday, the way in which many individuals experienced the initial moment of power failure may have been different. Not working Saturday night may be a luxury for some, however the underlying 'rules' that govern daily structures meant that for those who work during the week, it was new leisure practices that were formed. But for that evening, many simply '*went to bed, there was nothing else to do'*, certain technologies such as television were rendered useless as they could not allow those in Lancaster to have a 'normal' Saturday night.

Repairs began at 9:30 am the next day as soon as engineers could gain access to the substation. Residents were not directly provided with this information – instead they had to search for it. Electricity North West on twitter was alerting people to watch its social media channels posting on Twitter *'@ElectricityNW Keep an eye on our social media channels for updates, we'll be sending out another update soon on the situation in **#Lancaster***

#StormDesmond *(23:48 pm 5th December 2015)'* (twitter.com). Despite there being no internet or mobile connection in the city, the electricity company was asking those affected to use electronic communications, web 2.0 mobile and smart phone technologies as personal resources to gain knowledge. However, as with the images of the blackout addressed at the beginning of this chapter, the only direct way for those in Lancaster to know if power had been restored, was to move about.

After realising that the blackout not only affected their house or street many members of the community spent the day wandering around the city. *'Residential streets, normally quiet as a mortuary on Sunday mornings, were rammed. People checking on people. People just needing to be out, with people'.* (*The Guardian*, 9 December 2015). Boundaries became blurred as residents no longer belonged solely to a street or area of Lancaster; instead many were trying to move out of these areas of disrupted power, and at first this meant leaving their homes *'walking around like zombies, it was like the end of the world*'. Going outside was the first thing Susan did when she realised the power was not coming back on '*of course when it wasn't, that was when we went around the village*'. Jim also described this communal aspect of the blackout: '*more people out and about than ever in Lancaster, people didn't really want to bother staying at home. The shops that were open like Booths were full of people'*. However, many shops could not open without mains power; if they were open they operated a 'cash-only' payments system. Patterns of practice and mobility emerged as the community affected by the blackout sought to find sustenance, things to do and a confirmation from others that they were not alone.

Many chose to leave the city; the University of Cumbria and Lancaster University closed for the Christmas break a week early, providing transportation to Preston railway station, with the expectation that students would make their own way home from there. Figure 16 demonstrates this movement of traffic coming out of Lancaster and highlights how many people were trying to move away from the city. The image of congested motorway bore witness to people's ability to tolerate a reliable system that will still allow them to be comfortable when one aspect of the infrastructure breaks down. One interviewee stated that *'everybody was trying to get out [of Lancaster] to get torches, candles, mobile phone signal.*

*It was chaos; people were driving all over the place'***.** This ability to be mobile and move away from the city depended on having a car, and if they were unable to stay in Lancaster, having somewhere else to stay. *'People needing to be out'* affirmed existing borders created by the blackout, with both north and southbound connections to the motorway system closed.

Star and Bowker state that infrastructure is not absolute, that it cannot be abstracted from the people who design, maintain and use it (Star and Bowker 2010, 230). They define infrastructure as a *relation*, rather than material thing. Embedded within other structures, transparent in that it supports individual tasks without the need to be rebuilt or broken down, reaching beyond a single event. These relations during the blackout were redefined, as communities were forced together to understand what was going on and cope with the nature of the event. However, the events in Lancaster saw maintenance and resilience develop a new meaning - the ability to get away and remove oneself from the situation. The response of the individual to risk juxtaposes the ideas of community that many of the interviewees spoke about. For those who stayed, community was what allowed people to create a sense of normality, however for those who went away (or indeed, were stranded along the West Coast Main Line – no trains from London to Glasgow) removing themselves from the situation showed how it was not possible for many to maintain what they perceived to be an ordinary life. Issues of mobility took centre stage, the comfort and freedom of having access to a car and the ability to go stay somewhere else (friends, family, money) mitigated disruption.

Seventy-five generators were brought into Lancaster and power slowly began to be restored; every single commercial generator in the UK was mobilised to Lancaster by Monday morning. This allowed 22,000 households to be re-connected, the largest deployment of generators in UK history.[119] The restoration of power using generators was only a temporary measure, yet shops re-opened, lights came back on and electronic devices began to be charged. As services temporarily resumed, the city council began to be overwhelmed with '*demands for action'*.

[119] http://www.generator-power.co.uk/casestudies/responding-to-the-uks-largest-ever-generator-emergency

This included the demands '*to turn off low voltage LED Christmas lights'* on the streets of the city, which the council viewed as not considering of the difficulty in *'contacting contractors at short notice or gaining access to switching points'.*[120] These expressions of community power, the council and the neighbourhoods coming together, and their presumed knowledge will be explored in the next section. Nevertheless, the demands on the council demonstrate the contested ideas of how to conserve power and varied understandings of issues which took priority during the disruption.

Another institution that became overwhelmed with demands was the hospital. Lancaster Royal Infirmary became a place that was perceived to hold knowledge; members of the public who had been made aware the hospital had back-up generators went there to charge their phones. A message was sent to The Bay radio station:

> @MIKEREDDY We went through 1 weeks [sic] food in 1 day at the RLI yesterday! People were just plugging in their phones and laptops to any socket they could find! Don't they realise we are on a generator? All they are doing is draining the hospital power supply!?! 7 December at 07:21
>
> 6 December at 17:19 · Please don't come to the hospital unless your [sic] ill because it's a hospital not a refugee camp!!!!"

Again, social media posts highlight what was viewed as important in a moment of disruption. People considered the need to charge their phones as an emergency that required visiting an institution which in usual circumstances would only be visited for a particular reason. Despite there being no mobile phone signal whilst still only being able connected to generator power supply, the need to charge phones suggests that members of the public were preparing for the power to come back at any moment.

120 https://committeeadmin.lancaster.gov.uk/documents/s60846/OS%20Storm%20Desmond%20Final.pdf

On Monday 7th December at 4:00 pm, soon after this initial restoration, a second interruption to supply occurred. At this point Electricity NorthWest began to distribute hot food, burgers and chips on the streets of Lancaster, Kendal and Morecambe. For Alison, another charity worker in Lancaster, this provision of hot food saw those she provides services for, the homeless members of the community, on '*a level playing field'*. Those who were not homeless were in a similar situation to those who live without electricity and easy access to food and digital technologies when power is on. For Alison, the blackout highlighted the inequalities at play during everyday moments that are not disrupted (this has been discussed previously in chapter 3). Only Alison mentioned this aspect of social cohesion, interviewees who were not without access previous to the blackout did not mention their changed social position during the event.

Figure 17 is an image taken during the blackout on Monday evening. Taken by a professional photographer (perhaps why this image exists), the stylistic composition shows and emphasises the main object that was required during the darkness, candles. Without understanding the context, it could be presumed to be solely a candlelit dinner party. Yet, the people in the image are holding torches, suggesting to the viewer that this is not a traditional everyday setting. The photographer states that the couple are planning a walk for the next day, an activity that does not require electrical power. It is also interesting to note that this is not a walk where they are wandering around aimlessly as *The Guardian* article published during Storm Desmond suggests the community did, but rather a planned and structured activity. The image illuminates how amongst the shared experience by those who lived in Lancaster within the disruption personal experiences were varied. The demand for candles and torches (technologies that were utilised in the historical blackouts of chapter 4) was not only a reason for people to become mobile, but also demonstrated the lack of equipment already in the home that would enable an individual to cope with the disruption.

By Tuesday at 11:00am most of Lancaster was restored to generator powered electricity, with the switchover back to the grid starting that day and completed by the following evening. These uncertain days of on/off power and anticipation of power returning saw Lancaster

become a site where knowledge was constructed in different ways. As the next section highlights, the nature of putting knowledge into practice and the access to knowledge were important factors in infrastructuring a public that created a process for dealing with the disruption.

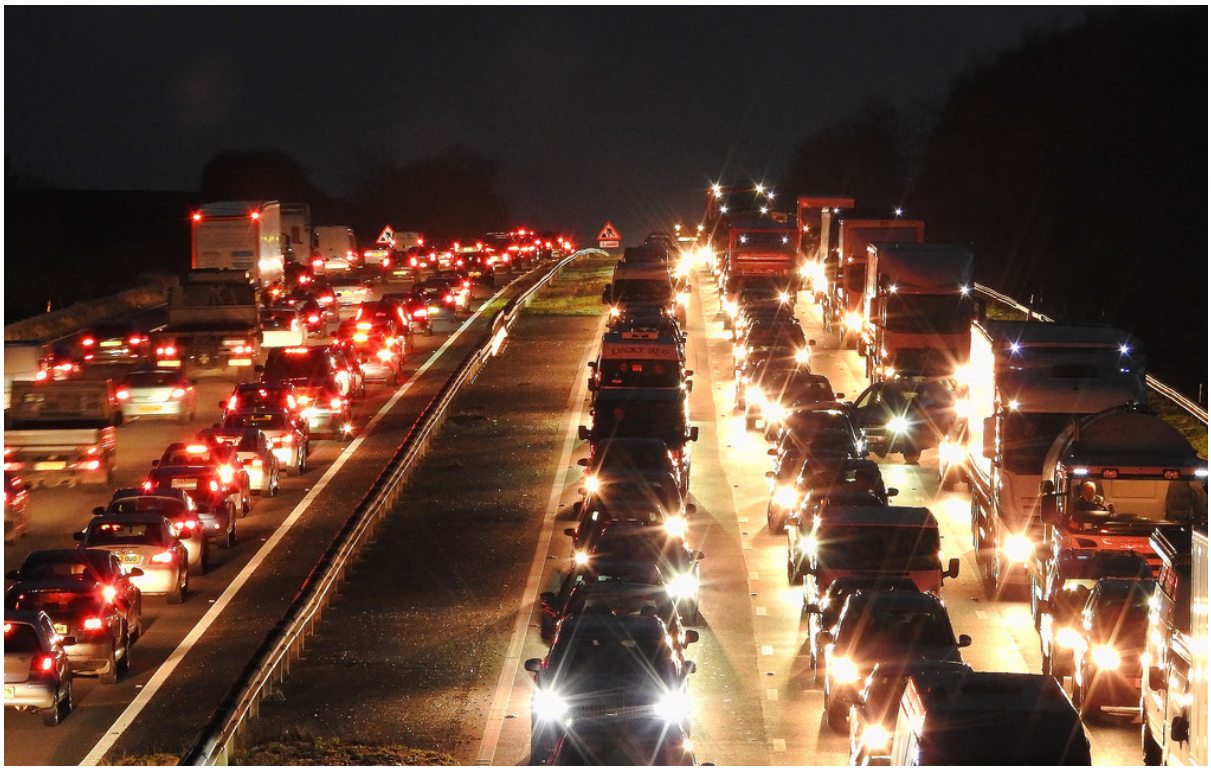

Figure 16: M6 Traffic in Lancaster, 6 December 2015 (https://www.flickr.com/photos/spudmonkey/23624176846

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Figure 17: Two residents planning a walk during the blackout https://flic.kr/p/

5.3 The Knowledge of Power/ The Power of Knowledge

The power cut was generative as well as disruptive, in so far as it produced new (temporary and enduring) connections, social bonds, imaginaries with 'insides' and 'outsides'. The experience of being cut-off from information gave rise to the presumption that those '*on the other side'*, who possessed the connectivity those in Lancaster did not, knew '*what was really going on'*, when in reality they too also knew very little. Alison only found out that there was a blackout in Lancaster on Monday morning when she drove to work in the centre of town from her home in the Yorkshire Dales, '*I knew the weather was really bad… I came into town and there was no power! Then I heard what had been going on all weekend'*. The power cut produced powerful 'islanding' effects (Sheller, 2013) although most road transport links remained open, local petrol stations relied on electricity to power underground pumps which therefore impacted on the availability of fuel for road journeys. In addition, West Coast trains could not operate due to flooding. In effect Lancaster became an island as people attempted to contact family, colleagues and help 'on the other side' of the blackout, who with internet access, were deemed to possess information regarding 'what was happening'.

In order to restore electricity, the substation needed to be re-connected to the grid. This knowledge intensive work required specialists from the electricity industry, the right working environment such as daylight, and guaranteed safety for the workers. Figure 18 shows this restoration beginning to occur, with engineers laying new cables in the substation. However, the circulation of myths about what was going on, alongside the attempts to restore some normality (see the use of candles and torches in the previous section of this chapter) created new domains of information.

Figure 18: Laying high voltage cables outside the substation (Electricity North West)

One domain which became a vital source of knowledge was the local Bay Radio station. Serving Lancaster, Morecambe and the South Lakes areas, the station was aware of the potential of bad weather and flooding on the Saturday morning. A decision was made for the news team to stay online and not transfer to the Sky News Desk after midday, as per the usual procedure. At 10pm on Saturday night, Electricity Northwest emailed the station to alert them to the fact that in '*in half an hour, 70,000 people are going to lose their electricity*'. The electricity company had issued a press release an hour before the city lost power, but only people actively looking for this information who were aware of the vulnerability of the substation to the impact of flooding would have known.[121]

At this point Bay Radio became the main provider of knowledge, and continued to be so throughout the duration of the blackout. As the news reader, Peter, read out the information that power was about to be lost on air, he *'finished his sentence and the power went seconds later'*. The station is based on the Quay in Lancaster and as the weather progressively got

[121] http://www.enwl.co.uk/news-and-press/latest-news/2015/12/05/05-12-15-flooding-puts-60-000-properties-in-lancaster-at-risk-of-power-cuts-(21-30-update)

worse, the station flooded overnight. Those working at the time decided to stay at the station and when Sunday morning came, staff rolled in *'for something to do, someone to talk to'* and to help with the flood damage. The station's engineer was able to restore a connection to the airwaves; at one point the station was broadcasting using only an aerial connected to a microphone for five hours. The landline telephone was working again from around 10.30am on Sunday morning; twelve hours after the city had lost power. The station became a hub of knowledge; information was circulated in a way that would not have been possible had it not been for engineers. This again highlights the importance of specialist knowledge – the engineer was the only person in the station able to get the connections running again. The radio became one of the few sources of information due to the relative embeddedness and interlinking of radio and mains electricity. The other radio station covering Lancaster, BBC Lancashire has a 'big patch' focus – *'it took two days for BBC Lancashire to send a reporter'* and national news coverage was unable to broadcast from the city. A reporter from Radio 5Live came to Lancaster but had to report about the situation from a studio in Preston. In order to access information, people in Lancaster 'went and bought batteries for radios, and sat in the car and listened to the radio' (car radios are a suggested coping strategy by Electricity Northwest, but again due to the information only being available online this knowledge was not accessible at the time).

Despite The Bay radio station being broadcast in the South Lakes as well as Lancaster, broadcasts focused solely on Lancaster and Morecambe the area where there was no power. This was because those at The Bay had *'no idea what was going on outside'*, and because the station was *'living what was happening'* the focus just became Lancaster. Using the word 'outside' to refer to areas that still had electricity demonstrates the belief that Lancaster was in many ways an island, cut off from others, with no news about places beyond the city. Practices of 'dwelling in mobility' (Urry, 2007), listening to the radio in the closed private space of the car was a strategy that eased the 'tolerance of strandedness', (Birtchnell & Buscher, 2011) mitigated through measures that enable people to endure strange surroundings. Due the radio broadcasts, a greater amount of resilience towards the disruption was felt by the community.

However, the station did not remain completely cut off from other places. In order for the station to broadcast news and inform the listening community, the presenters relied on another member of staff, Kate, who lived on a newly built estate in Heysham that was on a *'separate grid'* that was '*better connected'* and had power throughout the event. With access to the internet Kate was able to monitor various social media and inform the radio station about any updates and the time left before re-connection to power.

> Georgia: What was going on?
>
> Mark: If you listen to that [the radio broadcasts during the blackout] it is the most boring crap you'll ever hear on a radio station. No music, no adverts, no news, I was just running in and giving updates as and when, there was no structure to it at all. Often it was just lists of school closures, shops that were open, who won strictly [come dancing], who were out on the X-Factor. It very much evolved from stuff people needed to know to stuff people wanted to know'.

Mark's description of the broadcasts shows the disjuncture between what people needed and what they wanted to know. There was a feeling of needing to be connected to the 'outside world' in some way; this was demonstrated by the Bay Radio announcing the winners of television talent shows, despite no one who had lost power in their homes having access to a television. As with figure 17, the attempts to keep to the normal schedule meant that members of the community sought knowledge about aspects of their daily life, and the radio station became the space for these connections to occur.

Mark believed that anyone who was living in Heysham '*could have spent days and not known what was going on if you didn't speak to your neighbours'*, highlighting again the importance members of the community have placed on communication. The radio broadcasts became *'a one telephone line community… after 24 hours without power, what you need within the home becomes urgent'*. For those vulnerable and in need of a hot meal, the station read out addresses asking anyone who could to visit those who had contacted the station asking for help. There is a register for 'vulnerable persons' so when emergency occurs they will be

prioritised for care, yet the need to go on this list only becomes apparent when disruption happens. Instead, it was the radio station that became the lead coordinator of care, not only for those in the community needing access to information, but those with additional needs.

In the case of the Lancaster blackout, it was not only people who needed to be resilient, but additionally the communications networks. The connections between community and communication that have been highlighted through interviewees' reflections on the event indicate how knowledge was constructed through reliance on these networks. Had these networks not been in place, experiences of the blackout may not have played out in a similar way. The unexpected mobile lives, such as trying to get away from the centre or moving around saw power become a playful force, coming and going from different areas at unexpected times, the public was teased by the constantly changing dynamics. Social structures are reproduced and transformed through the everyday enactment of mundane practices, yet the mobility of electricity (coming and going) created a new social structure which was messy and uncertain. The relationship between electricity and communications, as well as that between the unfolding situation and *knowledge* of the disruption, meant that more power was held by those who did not have electricity than the company responsible for providing power, Electricity Northwest.

The company appeared to have most control over how the blackout played out, as demonstrated by the infographics (Figures 19 and 20) published in early 2016 by the company to highlight their work during the disruption. However, social media, in particular the use of Twitter by both the Power Company and members of the public highlighted how power was not solely held by the electricity provider. The initial moment of power failure saw people take to social media to log the disruption with the company, who were aware of the faults. *'@lancasterman @ElectricityNW powers gone in LA5, Bolton Le Sands. Add it to your list :-) credit to the engineers working tonight (22:46pm 05 December 2015)'.* As power began to be restored, the power companies blanket response of who had power, meant that twitter was used to demonstrate the gaps in Electricity NorthWest's knowledge about what was going on. Despite the company posting information, those affected by the blackout still messaged the company to inform them their power had gone out:

> **@davidlovessu @ElectricityNW** don't you think you should have tweeted power was going back off at 4pm so people following your tweets knew. (7 Dec 2015)

People in their homes could experience and see power before workers in the control room of Electricity NorthWest in Manchester could. This admission from the communications team handling the twitter account demonstrates the delay in knowledge that the blackout caused **'***@ElectricityNW @davidlovessu Hi David, we tweeted as soon as we knew. Those that went off knew before us here. Sorry :('.* Those in charge of disseminating knowledge were in an operations room with power, not in Lancaster and unable to see the disruption, agency was distributed in a new way that went against the traditional distribution structure of power companies and their customers.

Figure 19: Storm Desmond Electricity Northwest Operations (Electricity North West

F

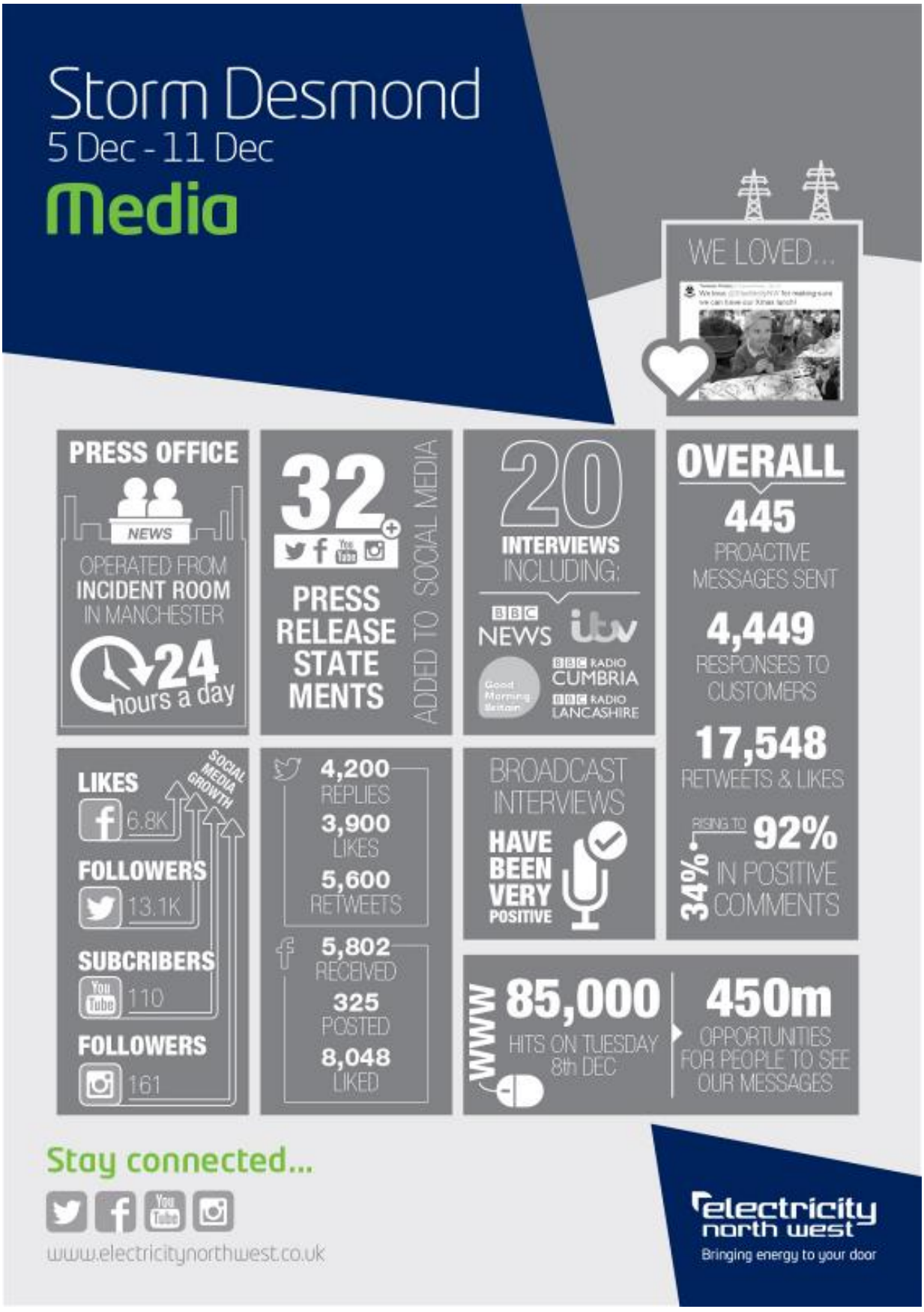

Figure 20: Electricity NorthWest Media Statistics (Electricity North West)

The infographics highlight how people, if they had access to the internet, searched for information. There was an increase of 13,100 followers on Twitter and 6800 on Facebook demonstrating the amount of people who were looking directly to the electricity provider for information. The company had the ability to give food (22,000 free meals were given out over the blackout) take food (as the food vans moved about to different locations) give power through connecting to generator, take power by asking people to only use what they 'need'. The explicit structures and rules governing the situation appear to have come directly from the power company. However, affected households had the most direct access to the knowledge of what was going on; they knew if the power had returned to their location before it was announced on Electricity North West's social media accounts.

> 'Please could we ask that those restored by generator in #Lancaster keep their usage to a minimum & only use appliances where necessary'. (@Electricity NorthWest 8 December 11:44)

The material characteristics of electricity created by emergency generators that were put in place hindered efforts by engineers, managers and civic agencies to gain control of the situation, as electricity in homes appeared to be back to an unlimited supply. Despite being asked to conserve electricity, many residents plugged back in their phones, televisions, and Christmas tree lights – causing a surge and overload on the network, causing power to go again. Bennett (2009) uses the blackout as an event to consider distributive agency. If we considered the grid as an assemblage, the removal of one node has a knock-on effect; people are part of this assemblage. The Lancaster blackout demonstrates that when non-human actors are dormant, people took on roles normally associated with the infrastructure. The blackout was a site of intervention; new non-human actors (generators) seemingly restored electrical power to homes. Knowing who had power on was often as a result of seeing a generator in place. Christmas lights became objects of conflict, as though many had been told to conserve power, how a person 'conserved' was subjective. Electricity Northwest asking those

restored by generator to conserve electricity caused a demand for more knowledge about the nature of the temporary measures:

> "Brian Kitchen How do we know if we are the ones restored by generator??· 8 December at 12:18.
>
> @Electricity North West We are using both generation and mains supply currently to try and stabilise [sic] the grid until full repairs are made.8 December at 15:31
> Brian Kitchen Are we likely to be getting any more power cuts this evening? Thx· 8 December at 15:35
>
> Electricity North West There is a possibility that managed power cuts may be needed to reduce strain on the network while repairs continue. We will work to keep as many as possible on supply 8 December at 18:41"
> "Electricity North West 1300 10/12/2015 #Lancaster Whilst on generator, if you experience any outages, we'll dispatch engineers ASAP so that you won't be off for long! #StormDesmond'

Electricity appeared to move (coming and going from houses, postcodes, streets, blocks) faster than information regarding its absence or resumption could be gathered and relayed by the power company. Due to its speed and volatility, the movement and restoration of electricity was particularly unruly. Secondly, because these socio-electrical networks are complex and dispersed no one person or institution had automatic overall control or holds an omniscient view of the situation.

One empirical method used in this study was a mapping activity. The focus groups highlighted the emphasis on shared experience. Interviews highlighted variance in discourses yet through using focus groups as a method, a space was created for individuals to understand, interpret and compare experience from their own perspective. Mapping further enhanced the collection of verbal data through interviews and focus groups, due to 'the roles and meanings of space and place in everyday lives' (Gieseking, 2013: 713) being highlighted in a new way.

In order to create the maps, participants were asked 'what does infrastructure look like?' and 'what does infrastructure mean to you?' After discussing their shared and individual experience of infrastructure disruption during Storm Desmond, they were asked to visualise their understandings of infrastructure. By bringing an 'invisible' concept to life through drawing, infrastructure 'maps' created by participants demonstrated how people unpack the systems by which we 'believe ourselves to be fluent in' (Edwards, 2007) in that we need little understanding of *how* it works to know that it does. Maps are not a natural thing to do when considering infrastructures, yet they helped participants to visualise process and conceptualise what infrastructures may be, they 'revealed complex relationships between thoughts, emotion, places objects and concepts (Newman, 2013: 228).

The idea of drawing the assemblage and 'making conscious' the technological unconscious, a term Nigel Thrift uses to refer to invisible infrastructures that escape notice (Thrift, 2005: 212-4) allows an understanding of the relations between different facets of the system, which as Paul Edward's states, is 'learned as part of the membership' (2007). The need for control not only created confusion between customer and supplier, but also about the nature of the substation and the system. There was confusion and then swift learning about the distribution system itself, as members of the community took on a new membership as part of a new infrastructure. For many in Lancaster, the flooded substation was the first they had heard about the physical structures of electricity. The circuits of provision were made visible and underlined (Generator – (local) substation – home).

The materiality of electricity is a concept used by Colas and Kharkhordin to discuss the plurality of materiality – we do not notice it as often it is 'hidden' (2009). Asking participants to draw infrastructure maps after speaking about disruption links with the idea that this fluency in infrastructure that means we do not need to think about the materiality, allows for conventions of practice, embodiment of standards, built on an installed base that only become visible upon breakdown. The activity highlighted the issues of discussing disruption to infrastructure after the event when everything is seemingly 'back to normal', but also demonstrated the importance of 'what's important to them, what their lived social relations are, and where they spend their time' (Powell, 2010: 553).

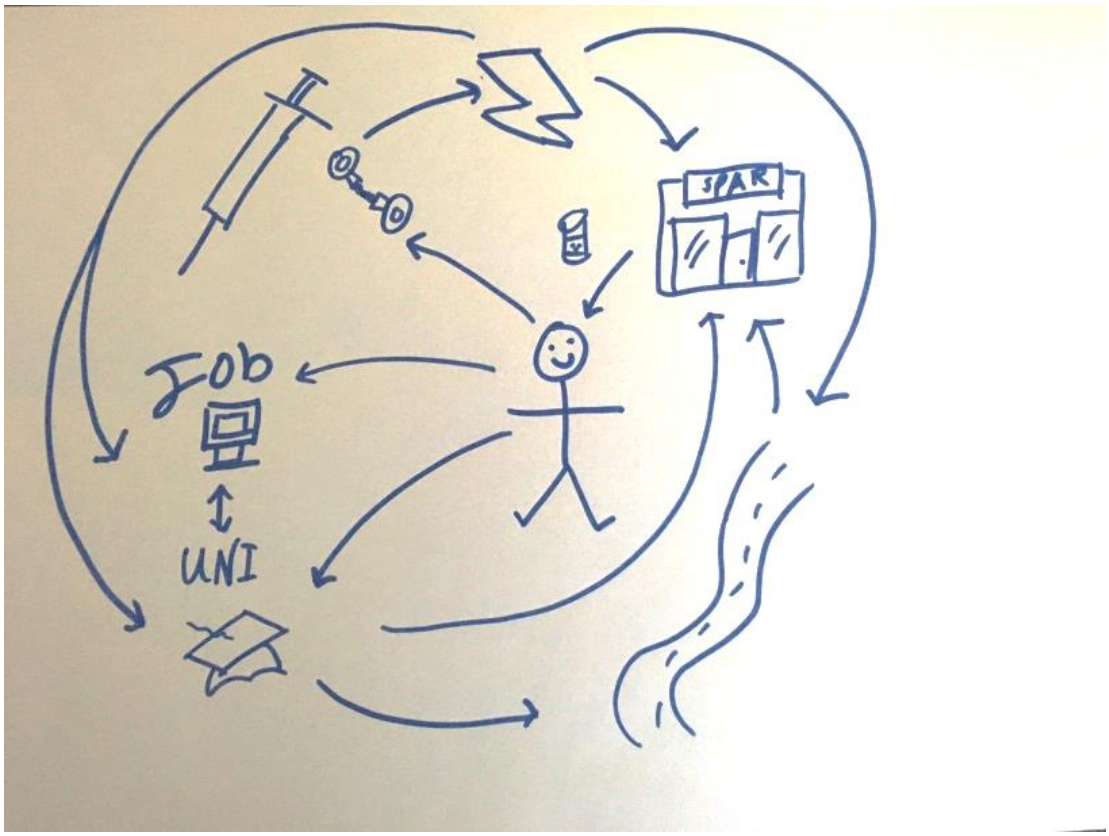

Figure 21: Henry's Infrastructure Map

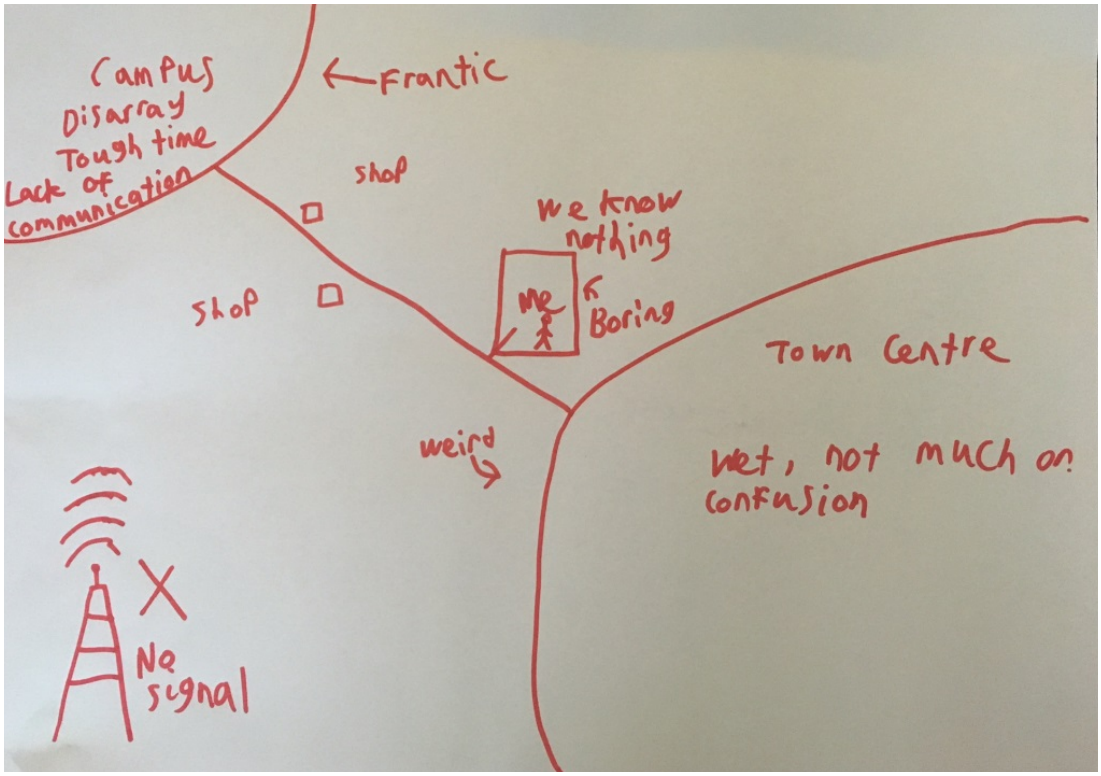

Figure 22 Phil's Infrastructure map

Lancaster's infrastructure network has many visible parts: power stations, sub-stations, pylons, wind turbines, communications towers, a canal, roads, motorway, universities, hospitals, shops and the town hall, are all material structures that can be seen from many parts of the city. In many ways their presence allows for the residents to know and feel connected. Heysham Power Stations dominate the 'Lancashire energy coast'; these are two tall, large scale box-shaped power stations that loom over the surrounding area. The power stations sit within an extended and securely fenced complex. High voltage overhead transmission lines supported by large pylons emanate from the power stations.

Figure 21 was drawn by Henry - a PhD student who has lived in Lancaster for five years. His infrastructure map demonstrates the 'membership' within the assemblage; individual tasks are supported by others within the network. In the image there is an understanding that the connections are there, the network appears to be circular – everything is connected however the only service directly coming back to the person is food. The arrows go one way and do not appear to support each other.

When asked to describe his map Henry stated;

> 'I started with a person, what do people need? [The person] needs food from a shop, but the shop needs power, without power the shop is useless. He also needs to get to the shop, so he needs to use a road, but if there are no road signs then the road doesn't work without power. He needs access to medicine and emergency services, again that needs power'.

After also describing how social infrastructure, such as a job or university also '*need power and the university also relies on the roads and the road needs power'* as well as the importance of food within the system '*if he doesn't have any food then he can't do his job or he can't go to work'* Henry goes on to explain the integration of the nodes of the network which he has included and how they work together;

> 'If that one thing fails then literally everything fails because some things don't work without the other things. Even if you can have the shop open, we might not be able to get to the shop because the roads don't work. If someone can't do their job then the university might not be able to stay open. So that's basically it, it's a house of cards basically'.

The idea that infrastructure is perceived as a 'house of cards', a structure that will collapse if one necessary element is removed, shows the importance and understanding of the connections in place. However, when Henry was asked what power in Lancaster physically looked like, he was uncertain, '*I believe power [in Lancaster] comes from the substation. As far as I know, we've got the nuclear power station at Heysham, is that a power station or is that just a reprocessing plant?'* He referred to the physical electricity connections as 'the main grid', with little definition of the electrical circuits or smaller substations that give power to Lancaster. He believes the university to be 'self-sustaining' as they have other sources of power '*the wind farm, but that only supplies 10 per cent of the energy, I know they also have a biomass reactor and a giant natural gas engine that generates power. So, the university is kind of self-sustaining, but not really. But then in town, everything just comes from the grid'.* Despite the power stations being visible from many points in the city and fringe farmland around Lancaster incorporating overhead powerlines and pylons, Henry was not sure about the nature of the structures in Heysham. The university has one wind turbine and the institution is not 'self-sustaining', which was an idea held by other participants of this study who were students, with one participant walking three miles from town to the university because he thought there would be power on site.

Henry was then asked 'what does infrastructure mean to you?'

> Henry: I know that in civil terms it means roads and stuff that everyone needs, but for me it's everything that a person needs to exist in a given place. Roads to travel on, shops to buy food and things you need, it's access to money actually so I probably should have included that, its access to medical and emergency care. I guess it's not really their job, but their job might necessarily be part of the infrastructure, but if the

> infrastructure isn't there they can't do their job which is where they get money, which is how they buy stuff.

Contrasting Henry's map with Phil's infrastructure map (Figure 22), shows a different approach. Phil's map is specific to the moment of disruption during the blackout. He places himself ('me' in the image) in his house and uses emotion and feeling to build infrastructure. Two bubbles are on the map, in the top left there is the university campus, in the bottom right hand corner the town centre. Connecting the two is Greaves Road, where the participant lives; he has marked shops on the map. The emotions that are expressed on the map, 'boring' 'weird' 'frantic' are ones which go against the idea that infrastructure is a dormant system. As the moments of testing and switching to mains power created further short blackouts, and there was a perceived lack of structured power networks, infrastructure became a relation that was emotional, causing emotional responses.

For Phil, the university was in a state of disarray due to the lack of communication, which for him is the most vital aspect of infrastructure. This is also demonstrated by the phone signal tower in the corner. In his home, he knows nothing, yet he chose to walk to campus, in the hope that the University would know what is going on. Phil's map demonstrates the links between data, communication, electricity, practice, and mobility. It could be said that for Phil, infrastructure only has meaning when it becomes visible – at this point the electrical blackout, as it is what he has chosen to depict in his map. He asserts clear boundaries to spaces, yet these were spaces that were in place before the disruption.

Both the maps included here demonstrate the focus and importance of connectivity within infrastructure. The maps are social, they relate to a set of rules and institutions that incorporate people and they consider the ways in which infrastructure is constructed and connected to other actors. They are both representative of a certain moment, for Phil this is the blackout itself, but for Henry the map is demonstrative of his personal stance and social relations at the time he drew the map. They both referred to what they knew and considered how they were aware of what infrastructure was. The blackout in Lancaster had provided a way for them to consider wider infrastructures and their materiality and the knowledge of

power as well as the power of knowledge saw new publics, ones that focused on the need to work together, created that relied on practices that were seemingly out of date and use - no longer part of everyday life – until disruption happened.

5.4 The 'Absence' of Technology

An article published in the national Guardian during the blackout stated a 'primeval urge' to be on the streets.[122] One participant, Steven, also noted the 'primal' aspect of being removed from the mechanisms which we normally depend on, telecommunications, the internet, and electricity. The interdependence of technological systems and life-styles is often viewed as what has made contemporary societies more prone to disruption than ever before (Trentmann, 2009). This nexus of technology, users and practice during the Lancaster blackout created an emotional response to disruption which saw the creation of imaginaries, such as the idea that electricity is what enables us to be more than 'primitive' beings.

This is interesting when viewed alongside the 'end of the world' narrative that was referred to by many participants. Hannah, who lives in the centre of the city, spoke about why she chose to leave Lancaster '*Nothing else to do today, no electricity, nothing at home, it felt like the apocalypse'.* The connection between boredom and the exaggerated emotions felt during the blackout demonstrates how disruption to underlying infrastructures that support daily lives, movements and practices reveals the power of structure and agency. The search for information and being engaged with what was going on, and the search for new supplies (candles and torches) were still activities that were occurring. However, the perceived dependence on electronic technologies for practice meant that ideas of 'doing' and agency were reconfigured.

Steven, an undergraduate student, spoke about what it was like to be without certain technologies during the blackout:

[122] https://www.theguardian.com/uk-news/2015/dec/09/storm-desmond-lancaster-floods-chaos-power-neighbourliness-ian-martin

> Steve: 'I didn't mind it, I'm not plugged in, I found it really cool. It made people think about how dependant we are on electricity, also it allowed for people to live 'primal', I think that is the right word to describe it, word of mouth was the only way of communicating with people. I was trying to spread information as much as possible when I found out the Tuesday news. It was really strange, I didn't mind it because I was in a fairly ok position, but to other people I don't think they would have enjoyed it as much'
>
> Georgia: What does not being plugged in mean?
>
> Steve: I'm not dependant on Facebook and everything, I'm quite old fashioned. I check it but don't need it. In an emergency I can figure out a way to get home. But also, I do depend a lot on using my phone, especially as a student. As on campus, everyone is cut off from town, so the only way we could communicate with everyone outside the bubble we were in was through using it.

Here Steve, an undergraduate student, highlights the tensions between everyday practices and how identity is constructed throughout disrupted moments. He identifies as someone who is not dependent on technology 'not plugged in', yet he often uses online social media as a platform to gain advice, uses his phone throughout the day and when the opportunity arose for him to leave campus and return to his parent's house in Manchester, a place with power – he only took his phone and his laptop '*When I was packing a bag I only took what I needed, it contradicts everything I've said because what I needed was my laptop and my phone. I didn't pack clothes. I came back to Lancaster a week later to throw away food and get clothes*'. In a similar fashion to Hannah's view of the blackout, what has emerged from discussions of the blackout are contradictions. There is not only a mismatch of the terms to describe the blackout but also a lack of understanding about the meaning of 'technology'. For many there was a focus on the digital, perhaps this was emphasised by Electricity Northwest's dependence on social media to relay information which was difficult to obtain without access to the internet.

For Steve, the lack of dependence on the internet is 'old-fashioned'. Practices came into play during the blackout that could be considered to be 'old fashioned'; radios were the only source of information, landlines and phone-boxes the only way to contact anyone without speaking to them face-to-face. Being competent to live in a different way and to be resilient, in Steven's case, living without the internet also fits into this category.

Modernity took on a new meaning. For those interviewed, the blackout was something '*this will happen again, in the future'.* A glimpse of a possible future where disruption was the norm and a reliance on the digital as an augmentation of the self was a facet of modernity which would continue to be prevalent. Looking forward, many of the participants interviewed spoke about how they now own candles, battery powered radios and torches. However, this normalisation does not play a part in lower energy demand as those participants interviewed a year on were living exactly as they had before. This goes against the idea that disruption creates change and an understanding that breakdowns will happen again.

As a result of Storm Desmond, Susan has given her staff landline phones to use at home. For her, these older modes of living, using candles, less electricity, less technology are valid and need to be fostered. She is embedding an older practice into the assemblage of electrical and data infrastructures, by ensuring she has material coping mechanisms (seen in other interviews with the ownership of camping stove, candles) that are there 'just in case'. Citizens are looking sideways for ways to maintain social infrastructures, in order to go forwards and are preparing for the future by using objects that are not vital to the system when it is working at full capacity. However, it is also Susan who emphasises the importance of needing electronic records in her work. Electricity-dependent advances have increased communications and digital benefits in so many ways (Luke, 2010) and yet those same advances in that electricity dependent infrastructure have also increased the consequences/impacts when something goes wrong.

5.5 Conclusion

Disruption made power *visible;* it *revealed* things we do not normally see, that we take for granted. This chapter has charted the development of the Storm Desmond blackout in

Lancaster and considered how this challenged not only engineers' ideas and preconceptions about infrastructure disruption, but also the general public's relationship with electricity during everyday life. Through enriching the reader's experience of the narrative by evoking emotional and visceral responses to add to cognitive ones, this chapter has served as a way of exploring the relationship between the visibility of power and the practices that occurred during the moment of disruption, as well as demonstrating the capabilities of those who lost power. First- hand accounts of the disruption through semi-structured interviews combined with social media posted during the event allowed the emotions and relations of disruption to be considered, how visible the disruption was and how lack of power enabled data infrastructures embedded within the electricity network to become visible.

This narrative approach led to a discussion of knowledge and power throughout the blackout, although the power company responsible for the distribution of power was leading social media content creation with updates about restoration times, the community affected by the blackout, living and experiencing the event were those who held the most knowledge. The local radio station became the dominant figure in disseminating information, with a landline telephone enabling messages to be received and relayed directly to those who were affected. Communication was key to resilience; the radio station allowed the community to remain connected. There was an adaptation of connections physically, with members of the public taking to the streets to cope with the blackout. Resilience throughout the blackout was mobilising. It brought people together who would not normally interact and linked them through a shared interdependency and experience.

The community was linked additionally through a shared infrastructure; this infrastructure became visible upon breakdown. Infrastructure maps have provided another facet of how individuals understand infrastructure and their agency and role as an actor within a network. These ideas of agency were considered in the final section, where the language of invisible (and a lack of) power was addressed, the notion that disruption causes inflated language of marked dichotomies. The blackout was viewed as both a beginning and an end.

The next chapter serves to combine both the historical and contemporary narratives that have been shown both here and in the previous chapter. It will consider how to address issues of the future using the methods employed. The 2015 blackout has suggested many implications for energy futures and the importance of the communication to allow a greater resilience. These aspects of the blackout will be discussed. Electricity-dependent advances have increased communications and digital practices in many ways. It is these same advances in that electricity dependent infrastructure have that also increased the consequences when something goes wrong.

6. Maintaining the Future

6.1 Introduction: Blackout Spirit

This chapter will bring together the perspectives offered in the previous two chapters by bringing the question of the future to the forefront. The case studies presented in chapters four and five are fixed according to time, 1974 and 2015, yet they demonstrate a number of similarities. As such, the chapter primarily addresses the ways in which they can be combined to think about the future. In both cases, memory was central to the exploration of both past and present, demonstrating how experiences are shaped by previous events. These experiences become myth embedded in the everyday practices of those trying to prevent disruption from occurring in the future. This chapter will revisit the 'myth' of the blackout spirit that was present, then move to an emphasis and exploration of maintenance, how the everyday work required in moments of transition demonstrated the human aspect of the design of the system but additionally something that prevented real change in the present from occurring, infrastructuring the future. The emergency plans created by several community groups in Lancaster after Storm Desmond will be looked at as an example of a tool of maintenance that allows change to occur in a future scenario. Breakdown is an intermediate stage that rarely lasts (Laet and Mol, 2000: 240). In this chapter I will highlight why maintenance is important in looking ahead, as it pre-empts failure and the stage of breakdown, arguing that maintenance is just as, if not more important than innovation within 'future-making'.

In Chapter Four disruption was viewed in relation to the lived experience of the Second World War. Individuals used both artefacts and actions that were already present 35 years ago to cope with a breakdown of infrastructure. Chapter Five demonstrated how the events of the 1970s provided a potential strategy for coping in 2015. Through looking at additional material from those interviews it is apparent that those who had experienced the power cuts of 1973 adopted what they believed to be the same mechanisms for being resilient in 2015, with

similar actions and practices. It was not only those who had been alive in the 1970s that used the three-day week as a perceived source of knowledge and understanding. Henry, a student, stated that he is less prepared for events like Desmond than his parents are, as they 'had to deal with blackouts all the time in the 1970s and they were much worse'. This belief, that there was a time 'much worse' than what was being experienced during the moment of disruption demonstrates the less dramatic than expected nature of the event once it has been experienced. It was no longer an isolated event but now something viewed in connection with other experiences.

Such reflection on disruptive events, along with a particular set of emotions to define the mood of an event where a community is stoic and determined in a difficult situation has been referred to as the 'Blitz Spirit' (Gilroy, 2004). Gilroy views this as the 'rejection or deferral of the nation's current problems' and 'the need to get back to the place or moment before the country lost its moral and cultural bearings' (2004: 96-7). 'Blitz Spirit' demonstrates the importance of past events on identity and the ability to cope during crisis. A campaign originally designed to sustain civilian morale, the concept has since been unpacked as a myth (Calder, 1991; Curran and Seaton, 1997) finding the believed ideas of class unity during the events of the Second World War to be false. The case studies in this thesis demonstrate how the wish to be resilient, to carry on through the event, was present in the form of a 'blackout spirit'. The impact of this spirit created a moment that was perceived to demonstrate the formation of new publics - those who came together in an attempt to return to stability. The 'blackout spirit' in both cases was not only to assert normalcy. Additionally, through these emotions, it has since held these moments up as ones to reflect on and hold to account when considering the complexity of the event.

Historians have previously attributed the creation of 'austerity politics' to the beginning of the Thatcher administration in 1979, with policy structures serving to 'legitimate regimes which constantly argued that despite appearances to the contrary, resources were scarce' (Hatherley, 2016). As demonstrated in Chapter Four this notion was already embedded within the public psyche prior to 1979. The nation faced disruption to everyday life in 1974, such as the ration coupons that were provided to drivers and letters written to newspapers about the

minutiae of the crisis (4.2). The Three-Day Week was the beginning of the concept being used as a tool to justify austerity and an altered working of the governance system. In a party-political broadcast Prime Minister Edward Heath stated the moment would be a 'harder Christmas than we have known since the war'.[123] Equating the crisis to the effect of the Second World War on the Home Front was not just a construct of the political sphere, used to shape political beliefs, but was a feature of everyday life during the energy crisis.

The shift in government intervention and management structures from Post-War nationalisation to privatisation in the 1990s, resulted in the 1970s becoming the political rhetoric used for 'hard times', fraught with false ideas and nostalgia (Pemberton, 2015: 7). For example, in his first speech as Deputy Leader of the Labour Party in 2015, Tom Watson illustrated the misunderstanding of the events of the decade, 'I remember the lights going out because Mr Heath was not paying the miners enough money', the need to be resilient to the believed mechanisms of past are still important in shaping power, politically and physically.[124] During the 2017 General Election in the United Kingdom, the phrase 'going back to the '70s', was utilized by right-wing newspapers as signalling incoming and widespread disruption and disaster if Labour were to gain political power and Jeremy Corbyn were to become prime minister.[125] Considering the disruptive events explored in this thesis, a Royal Academy of Engineers report on the 2015 blackout in Lancaster stated that the historical infrastructure was the cause for the extent of the disruption in the city (Kemp, 2016). Contemporary newspaper reports warning of power cuts in the future refer to 'talk about winters of discontent and blackouts', suggesting that the past is the framework by which to consider futures where power cuts are common place, as they have happened previously.[126]

[123] https://www.youtube.com/watch?v=bj9OlliHFo4

[124] Tom Watson, Deputy Labour Leader Speech, September 2015 https://www.youtube.com/watch?v=qf6Lohny3uQ [last accessed 17/11/2017].

[125] http://www.dailymail.co.uk/news/article-4494728/Labour-manifesto-plans-return-Britain-1970s.html

[126] http://www.telegraph.co.uk/finance/newsbysector/energy/10533577/Lights-will-be-dimmed-but-not-go-out-says-electricity-chief.html

As Moraglio has noted, there is inertia at the core of infrastructure systems as often they are conceived, tested and created decades before (2015: 11), with publics conforming to this design for years after. There were changed infrastructure systems and the electricity grid between 1974 and 2015. The publicly owned network of 1974 is now privatised and divided and the grid that existed in 1974 has been constantly extended, repaired and altered to create the current system. The responses to the disruptions of normality also raised debates on the roles of various actors, differing in each case study due to the ways in which governance of the system were standardised.

The use of memory was presented as a feature of resilience during a time of disruption. This mood was encapsulated by an article in *The Guardian,* published during Storm Desmond;

> 'Some of us remember the agreeable pace and candlelit pubs of the three-day week, when society adapted to predictable energy rationing. You put another jumper on. If you needed "to communicate" with someone, you rang from a phone box or walked to their house'.[127]

Here the memory of 1974 is embedded within the recollections of the journalist, who creates a divide; between those who are older and therefore perceived to be more experienced in comparison with those who were not there, in contrast with those who were not there and cannot used 'Three Day Week' of 1974 as a memory to look back on. The language used evokes the myth of a 'blackout spirit' in a way that divides generations. By placing the reader back in 1974, during the three-day week, into a perceived situation that this thesis has shown is a simplistic, innovation-centric view of the disruption is a mechanism which allows for further decay of the system. The causes and nature of the 2015 Lancaster blackout were

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1. [127] **''Hammering, grim, brainless' – how Storm Desmond hit Lancaster',** ***The Guardian,*** **9 December 2015, https://www.theguardian.com/uk-news/2015/dec/09/storm-desmond-lancaster-floods-chaos-power-neighbourliness-ian-martin.**

different to 1974. Looking back in this way ignores the problems of the present, there is focus on what has happened rather than what could and will happen. Instead, the future is taken as a moment where processes need to be removed from what has gone before, and be completely new. This is where innovation fails as a method for coping with change and disruption to infrastructures in the future, as it does not incorporate multiple timescales and structures of power.

By positioning the narrative of the past event as central to the situation being experienced in the present, the problems of the moment are hidden by a need to believe the disruption is less severe as they are compared to a situation that had different causes and consequences. For example, the effects and rate of climate today are different to those in 1974. The journalist of the *Guardian* piece continues by commenting that communication technologies of today are the problem; 'what's different now is our shocked disbelief at the disappearance of the internet'. This version of the 'Blitz Spirit' myth – that communities have a historic ability to endure suffering by 'keeping calm and carrying on' is damaging to use when looking ahead to the future as it prevents a recognition of previous failures, current problems and subsequent events. It overlooks the technologies and practices in place in the present, this suggests that those who experienced the 1970s are the individuals who can be resilient during further disruption and that both the nature and management of disruption was the same in 2015 as it was in 1974. This was not the case. As 2015 demonstrated, not everyone who lost power had experienced previous blackouts, yet the community was still able to cope through the disruption. This false belief highlights how not only the present is inherently connected to the past, but additionally futures and change are dependent on what has gone before. Memories and path dependency matter because they set into place actions and attitudes that remain for more than one generation, memories are shared between generations – as are policy decisions.

In both case studies, publics were formed to tackle a specific issue that needed to be tackled, the threat or reality of power cuts. The public sought to be resilient to the threat of further disruption and cope with what was happening by coming together. However, their actions were not about creating innovative ways of coping with the threat and change. Instead,

actions and affect during the blackout were about maintaining current systems of power rather than radical overhaul and change. Closely related to the ideas embedded within increased morale during crisis, considering *maintenance* as the tool for dealing with this complexity, rather than this nostalgic and fabricated community spirit, this chapter focuses on the practical immediate futures, change and actions after the event, demonstrating the continuities and differences between disruption, normality and other moments of disruption. How people in the present respond to the past and act on the future is meshed together in a way that needs to be understood by those living with the systems that are affected by disruption. The proximity of cultural experience of hardship and pulling together in the war made a difference in 1974 at a national level, as it was a time when publics had been formed to cope with disruption to everyday practices, with national importance. In the case of the 2015 blackout, this was not lost but rather adapted to the local level – those who had lived through 1974 became the ones who referred back to previous cultural experience. It should also be noted that although no participants in 2015 referred to the Second World War, this is because none of the interviewees had lived through this event. A generational difference in memory occurs with the passing of time, people who have experienced past events die and those connections are lost.

This blackout spirit illustrates the perceived emotions of community that prevent possible new futures from emerging – by viewing the situation as a temporary event that will be solved by mechanisms of the past. A temporary stabilization of a temporary event. Mediation through a 'blackout spirit' acted as a 'process of relation that involved translation and change' (Anderson, 2014: 13). Power systems, both the network and Government during 2015 were different in their structures and standards to those in 1974. Similarly, the electrical grid and methods of management were different in 1974 to those in the 1940s and the Second World War.

6.2 The Need for Maintenance

Although repair work has been a topic of study within participatory research, less attention has been paid to tacit structural features such as temporal orders (Felt, 2014). Combining case studies is important as it addresses the way in which time is ordered by maintenance

practices. Maintenance of infrastructures has been considered by Graham and Thrift, who highlight the need to understand physical maintenance in looking ahead, as he notes the need for repair to secure the possibility of the city, 'the remorseless work of repair and maintenance' (2008: 21). Thrift views maintenance and those who 'maintain' as 'foot-soldiers of innovation', as without it innovation will fail. This thesis seeks to move away from the idea that innovation is a key agent in creating, amending and making the future, neglecting the present decay of a system in order to anticipate a *better* future. Similar to Thrift, Russell and Vinsel interpret maintenance as the labour needed to stop a system from decaying (2016).

Between 1974 and 2015, mechanisms believed to be 'innovative', such as the shift to alternative energy sources saw further strikes and shortages. Most notably, the 1984/5 Miners' Strike, when the National Union of Miners staged a year of industrial action due to the closure of several coal mines in Britain. In 2015 coal consumption was one tenth the amount it had been in 1974.[128] There were no coal miners in the United Kingdom in 2015 and those who employed in electricity generation are forbidden to go on strike by law. The electricity network today is fragmented, each part having different organisations responsible for overseeing the infrastructure. The development of a complex relationship between state and publics meant that often it is only when a disruptive event occurs that people realise their system-dependence and role within the system.

Hall and Smith have noted that without constant maintenance, power structures would soon be compromised if work was discontinued 'how quickly even our most massive and concrete modern accomplishments would be compromised' (2014: 9). Thrift's approach to maintenance, that it is about the quotidian and small activities that allow an upkeep of structures, rather than the 'big picture' of policy and governance, is a lens by which to view the future as it highlights how publics prevent problems from occurring. After a breakdown, repair is central to the immediate future, however the breakdown first appears not because the need to repair has been ignored, rather that the problems were not visible or considered in the first instance. This is the complexity in action (2.2). To illustrate this dynamic we can turn to our case studies, when the connectedness of the system and the 'systemness' of

[128] https://www.gov.uk/government/statistics/energy-consumption-in-the-uk

everyday practices (2.3) (Urry, 2016:73) only became visible when infrastructures were compromised (5.2). For the user, energy is expected to be present in the home on a day-to-day basis; the user does not see the ways in which it might need to be repaired until disruption occurs to them. Human action is central to the system, yet people are unaware their actions play into it. Systems operate 'behind the scenes', with the lay public unaware of how they demonstrate and how they 'bear' systems as they go about their lives (Urry, 2016: 87).

Maintenance is not only an act within infrastructures, such as the grid itself, but additionally social infrastructures and publics (after Hall and Smith, 2014). In 1974 the power relations between government, worker and the lay public needed to be repaired. This was due to the lack of upkeep that had been required to keep the system working, in a changing time of increased energy demand and consumption, compared to when the electricity network had been brought into public ownership in 1947 (4.1).

Maintaining publics within the system is highlighted by Bowker and Star, who emphasise the importance and necessity of 'standards', not only the technical but that the practices of individuals get 'hustled'' into standard form as well (2000:139) The standards that are adopted, both technical and social, are not always necessarily the best. These standards are often set by organisational bodies. In 1974 the government dictated the ways in which the public used electricity, promoting increased use of energy in the domestic sphere (see Chapter Four). In 2015, Electricity Northwest were responsible for connecting electricity to the home, but private energy companies set the price of energy and did not inform the user how much to use, and how. Yet energy saving rhetoric has become part of everyday life. The maintenance of these standards presents ethical and philosophical decisions, as those made early on in the standardisation process can have a huge impact on how the user integrates with the infrastructure. The electricity network in the UK was developed and geared towards a constant and steady supply. To change habits of usage requires a new 'hustle', one that will take years to embed into infrastructures. Combining these aspects of the system, the maintenance space can be viewed as the period between events. Power cuts can be viewed as points of visible unkempt maintenance, a point of 'slow disaster' (Knowles, 2016), allowing the invisibility of the neglect to become visible.

The case studies highlight the maintenance of power and the long processes of deferred maintenance on technological systems that cause power shifts. Lack of maintenance is casually implicated in 1974 by the need to ration electricity to the nation, in 2015 the blackout being caused by the flooding of the substation. The systems appeared to be fine prior to the oil crisis and the impact of climate change, by viewing the contextual large-scale dynamics suddenly the systems seem badly maintained and badly adapted, adding to the complexity. Through upkeep of a 'top-down' structure, where decision makers are high up in the structure, processes further along the chains within the networks are neglected. One way to view this is through Hughes' notion of the 'reverse salient' (1983), points which slow the development of a system and have the potential to create further issues in the future, as without fixing the issue the system's development comes to a halt. In this instance, electrical blackouts can be viewed as either the reverse salient or the symptom of several reverse salients. In either case the solution to these problems does not have to come from the same register, a political solution may help a technical problem, and vice versa. This again demonstrates the characteristics of complexity in action and how in order to understand infrastructures and the publics involved with them, the relationship between background and foreground needs to be problematized, the lights need to be turned on to different parts of the system. A broadening of responsibility occurs and the governance of the system addressed.

6.3 Changing the 'Systemness': Complexity and Maintenance in 1974

New systems are central to imagining future scenarios. The structures of governance and the power network in Britain during both case studies demonstrated the forms of expertise that were intended to sustain a sense of normalcy when infrastructures were breaking down, examples included are government information campaigns and electricity distributor knowledge (5.3). Those who undertook methods of infrastructuring a new public were able to sustain themselves throughout the disruption. In the case studies the public was presented as 'suffering' due to disruption (4.2). Recent technologies, such as smartphones, 'make the future present' for 'ordinary people' (Kinsley, 2010). In 1974, a shift in policy, the need to

conserve energy was translated and visualised for the public into an information campaign, presenting a corporate led future vision into the homes of those who would be living through the wanted changes. No other films were created with the same approach, daily editing was necessary as it was not initially clear which parts of the system would be affected by the crisis, demonstrating again how the system becomes visible during disruption and not prior to the event.

Prior to the event individuals are the ones who drive demand and dependence on the system, during the event, publics having knowledge of the system are able to live through disruption. However, after the event newly obtained knowledge is central to restoration and maintenance so that the system can go 'back to normal' and transformative practices can be put into place. Within transitional and transformative models of change, innovation is often considered to be the driver of development (Moraglio, 2015). Transitional models acknowledge that we are living in 'transitional times,' taking as their central premise the need for societal transition (systems-level change) to more sustainable futures. Connected to long horizons of time and compelling visions of sustainable futures, they assert that the transition must be based upon new knowledge and skill sets. Transformative models take a situation and view the future as requiring a radical overhaul of current practices. Caution should be taken when considering the future within a framework of advanced technologies on a massive scale, those which are inclusive, accessible and readily available to all. Within both case studies, there was a sense of 'making sure this doesn't happen again', yet this was tarred by the complexity of the infrastructure in place.

In Chapter Four, the analysis mapped and interpreted the threat of national power cuts against a backdrop of management, leisure, time, beliefs and change. It demonstrated the nature of crisis on a national level; within this scenario, the future can be viewed as the 'mechanisms and tendencies of change and transformation, and those directions of the transformation in society' (Hobsbawm, 1981: 3). The disruption to leisure activities such as football demonstrates the impact of 'suspended time', yet the return to normal kick-off times, soon after the crisis was deemed to have ended, shows how the structures of everyday life were not significantly altered. The three-day week may have been a suspension of day-to-day

work, but as an interruption of normal governing structures it created a way of looking towards an everyday future that incorporated a different scenario than previously acknowledged This unknown future was translated into a present that required a new way of understanding the complexity at play within energy infrastructures.

The complexities of the relationship between publics and the infrastructure system became visible in 1974, through the public information campaign 'Switch off Something' (4.4). The campaign was not about an innovative means of decreasing energy demand or production, but rather economising in order to maintain the power supply and provide vital industries with an uncompromised supply of power. Simple home economies put into place were acts to maintain the power systems, both political and social. This began a new 'social future' and a shift from the individual not only being part of a nation that had recovered from the Second World War thanks to nationalised industries, but additionally they became responsible for their own relationship with power and electricity, fitting into a larger scale of 'systemness', the socio-technical networks, infrastructures and design protocols that dictate day-to-day life. Analysis of the discourses employed in everyday life by 'ordinary people' needs to consider their engagement with infrastructure systems, pre-empting and anticipating what is to come (Anderson 2009, 2010), be that disruption or a steady path. The face of power, its tangibility and how it manifests are inherent to understanding Social Futures as without it. Practices used in the past are redeployed in future, though under different circumstances.

There is a strong relationship between maintenance and design, as Thrift notes *'t*echnological paradigms oriented towards the fetishistic generation of accelerating waves of quickly disposed of hard products could be reorganized around longer- term and sustainable systems of service delivery designed from the outset to be easily and continually upgraded" (2014:9) the purpose of design is not just to build an artefact to fulfil some genuine social need "out there" but also to make us reflect on how that need has emerged, how it has become a project worth pursuing, and how, all things considered, it may actually not be worth pursuing at all' (Morozov, 2013: 329).

The ability to change and alter the content of the film *'Switch off Some Power'* demonstrates that even within a changing future, the knowledge of what would be required was uncertain. However, instead of presenting uncertainty as something which was detrimental it was used as a catalyst for preventing certain scenarios from occurring. After the event, electricity was no longer sold in abundance with accompanying products and technologies; instead the network became a tool for maintaining ideas of nation and communities. Here ideas about the nation are synonymous with the people who reside there, the need to support nationalised industries as state-intervention could only achieve so much. Practices used in the past are redeployed in future, though under different circumstances. No other public information films were created with the same temporal approach. Daily editing was necessary to not only highlight why the public needed to save power, but to keep updated what needed to be maintained during disruption.

The year 1974 became a key point in shifting the 'expected otherness of the future' (Kossellek, 1983), at a time when ecological apocalyptical imaginaries were shifting. An abundance of energy was no more, the idea that energy was not finite and the notion of peak oil and the 'limits to growth' came into play. Public diversions away from the crisis, that external impacts on the grid did not have widespread and wide-ranging consequences as they had in 1974 meant that during the next Miners' Strike in 1984, the grid had been altered and developed so that power could be diverted to areas that needed more supply than others (Milne, 2004: 143). This further division of the grid system was not the only breakup of systems that occurred. When read alongside the events of Storm Desmond in 2015, the 1974 case study of the week highlights the shift from corporatism to neoliberalism as not only an economic doctrine, from national to private, but the emphasis on the individual and their role in their own lives.

The case studies of past and present power failure have demonstrated that these shifts are enacted in ways which do not need knowledge of the complexity of the system. The shared infrastructure that existed between 1974 and 2015 saw the home, rather than the state, become a key battleground in responsibility for the issue of energy demand. Social acceptance of new systems is vital to integration of innovation (Fraedrich, Beiker, Lenz, 2015).

However, because the systems still look the same physically with visible infrastructure, wires, grids and substations - objects that suggest things are going to plan - the new invisible systems and increased connectivity are not considered until the breakdown of the historical infrastructure.

The shift in organisational structures was a key change in the responses and resilience towards notions of crisis and disruption. The 'post-war consensus' that had resulted in the crisis of the consensus shifted decisively with the 1979 election of a Conservative Government under Margaret Thatcher, which favoured the 'right' of employers to 'manage', with government rolling back state mediation (Mueller and Carter, 2007). The Miners' Strike of 1974 highlighted the power of the union, and throughout the 1970s, official strikes from various trade unions became a regular feature of everyday life. This cumulated in the winter of 1978/9, often referred to as the 'Winter of Discontent'. After the 1979 election, the events of the 1970s were considered to be the proof there needed to be a roll back in state mediation**.** Mueller states that privatisation was responsible for the rise in public relations, challenging the structure and organisation of society through private platforms having an influence on our day to day lives. Where state involvement in everyday and private life had been commonplace in 1974, the shift to a new economic doctrine enabled a private, individualised future of Britain to form.

The complex assemblage of 'institutions, organizations, and interactions involved in the exercise of political leadership and in the implementation of decisions that are, in principle, collectively binding on its political subjects' (Jessop, 2016: 16) altered its makeup and presentation. As the next section shows, the rise in PR allowed for futures to be presented in a different way to how they had been during the 1970s. Although it could be suggested that changes occur through the use of innovative methods, a greater emphasis on the present power structures was the driver of change after the disruption.

6.4 Communicating Maintenance after 2015

> 'Whenever a customer in the North West flicks a switch, they can take for granted that the lights will come on'.[129]

The role of maintenance is shifting. After 2015, the use of social media makes maintenance an integral part of binding customers and providers closer together in the uncertainty of more risk and breakdown prone electricity systems. After the event, responsibility sets in; actions are taken to prevent the disruption from reoccurring again and an emphasis on making the everyday work invisible again - a return to a 'normal' functioning system occurs once more. Energy companies are required to comply with 'Grid Code'- how they are connected to the grid and able to be held accountable for their actions. This occurs through government regulation that creates a code of conduct for all private markets connected to the National Grid. The system appears to revert back after disruption, which is interesting because it is unclear how desired low energy practices are in reality and highlights how high energy is dormant in forced low energy lives. Communications were central to creating and mobilising publics during the events, after they also created a way for communications between provider and consumer to increase. The opening line of Electricity North West's Poyry Report, a report that enforced the need for 'low carbon solutions' that was commissioned to address the problems facing electricity demand in the near future (stated as the year 2035) parallels with the opening lines of the *The Public Services: Electricity* (1966). The action of 'flicking a switch' still demonstrates the instant and controllable nature of electricity that is perceived as *de rigeur* today. Published in 2014, before Storm Desmond and yet still in a period when the threat of a blackout was still viable, the report emphasises the idea that 'taking the lights for granted' is connected with the visibility of the infrastructure. Chapter 5 demonstrated that during Storm Desmond this presupposed idea of what electricity could do was dismantled through the disruption of mobile communications, transport infrastructures and institutional structures.

[129] http://www.enwl.co.uk/about-us/the-future/useful-sitelinks/the-poyry-report

However, since the blackout, Electricity NorthWest have presented maintenance as a way of connecting their influence on the grid through the medium of social media, conveying their belief that the company is vital to 'keeping the lights on'.[130] Every time a power cut occurs, a tweet is sent from the distributor's head office in Manchester, informing those who are following the account that the company is aware of disruption to the network. The exact number of customers affected and the location are sent. The specific information is being presented as not only a form of expertise but as a knowable fact. Highlighting the uncertainty of disruptions; the system becomes visible through the use of tweets, changing the relationship between those who are responsible for the system and those who use it. Those who followed Electricity NorthWest's social media accounts during the disruption and kept the connection after are aware of the maintenance that is occurring.

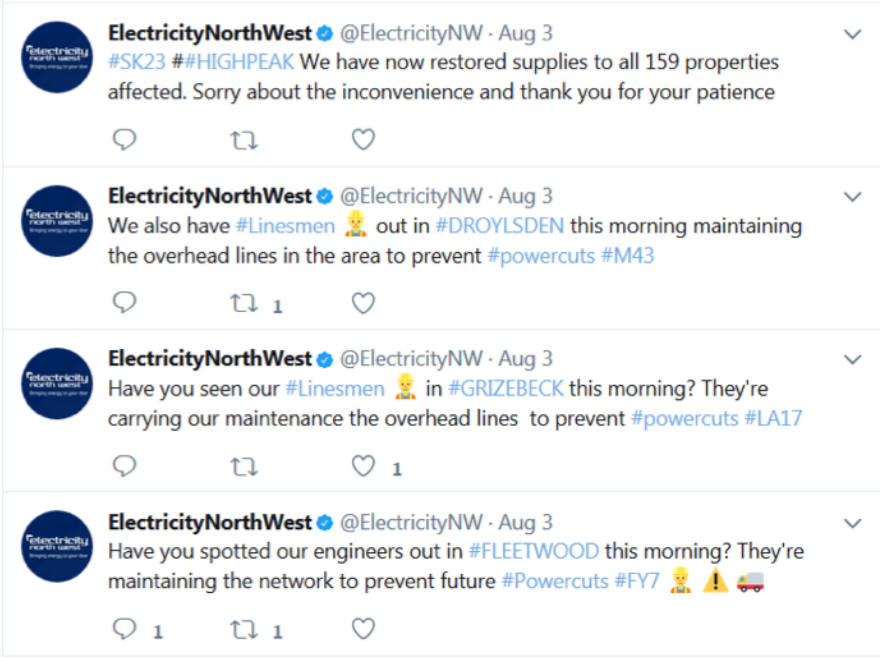


Figure 23 : weets sent from @ElectrictyNW, August 3 2017

Through this acknowledgment and explanation of repair work that is going on constantly by engineers and '#linesman', the workers (illustrated through the use of an emoji of a male construction worker wearing a hard hat 👷) become a tool to highlight the work of company on social media. Although this can be viewed as an appreciation for the work that is ongoing, Thrift refers to this as part of an 'under-observed infrastructure of kindness' (2005: 145). The

[130] ENW TWITTER

need to highlight the preventions that are taking place demonstrates how the visibility of maintenance is viewed as an innovative act that connects the network with the public. Questions such as 'have you spotted?' suggest that these acts are not usual, that they are something to be noticed, and celebrated. It could be said that the companies are trying to sell the labour of maintenance, again emphasises the idea that change is occurring. This exercise in PR produces several tweets a day, for example on the 3rd August 2017 (Figure 23) 26 tweets were posted on the @ElectricityNW account, referencing acts of maintenance that were occurring to prevent power cuts. Despite power cuts being associated with winter - due to both common cause (poor weather) and effect (no heating) – the maintenance work occurring in summer allows the company to remain at the forefront in people's minds. The use of location hashtags creates another level of visibility, as those who do not follow the account but are searching for tweets based on location will see the posts. Maintenance may be going on around us all the time and may appear 'inconsequential- and on the other hand essential' (Hall and Smith, 2015: 6). By presenting upkeep of the electricity network as a benign act that is part of the everyday, Electricity Northwest can be viewed as asserting their power when things go wrong, as they are responsible for electricity grid transmission in the North West England. Elaborate, make concrete what I mean? One could also say that they anticipate accountabilities and deflect them.

The notion that power grid and the company that run the distribution are 'largely responsible for the feeling that things work, and will go on working, without the need for thought or action on the part of users beyond paying the monthly bills' (Edwards, 2003) is emphasised through the use of PR to connect with customers. The company presents the idea that there is no need for the public to change any aspect of their day-to-day to day life, as it is all under control. These acts of maintenance are presented as a 'hundred little daily experiments in making a better world' (Plummer, 2013: 514).

During the storm, the 'slow decay' that is central to ideas of maintenance was used as a key tool for demonstrating power and knowledge of the system. Electricity NorthWest and engineers placed the slow decay of the historical infrastructure - the placement of the substation - as a key explanation for why the event occurred (Kemp, 2016). The worsening

weather and rising sea levels do not bode well for a substation built alongside a river. Here the shift was not solely the physical system breaking down, but additionally the way in which expertise was carried out. Activities to maintain the future do not taking place solely when the system fails, rather the blackout created a moment from which to engage with activities to prevent further blackouts. By using the platform to engage with the increased connections on social media, Electricity NorthWest are not only attempting to emphasise their governance of power networks, but additionally the need to demonstrate that change is occurring. This 'maintenance in action' shows the need to make visible the 'experts' in routine acts that provide a wider context to workings of the network.

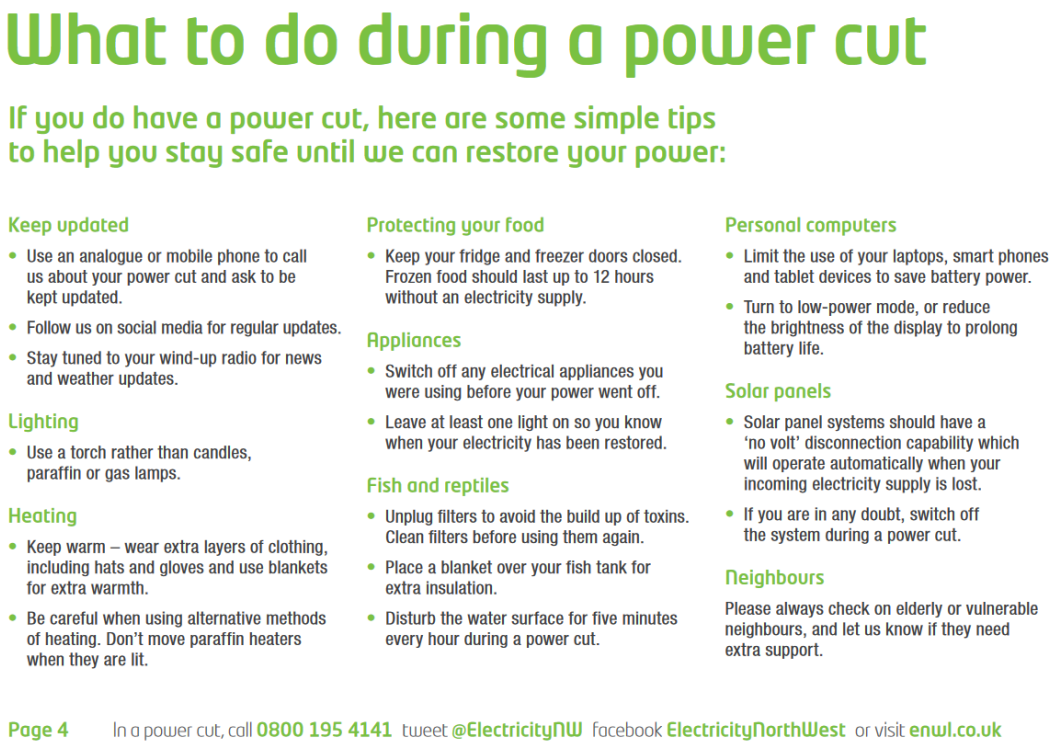
How to prepare for a power cut

Use this simple check list to make sure you're prepared in the event of a power cut:

- ☑ Keep **our contact details** (which are on the back of this booklet) to hand or store them in your mobile phone.
- ☐ **You will need a phone that doesn't need a power supply.** Digital or cordless phones don't work during a power cut.
- ☐ Keep a **battery operated or wind-up torch** handy.
- ☐ Get a **battery operated radio** so you can listen to updates and weather reports during major incidents.
- ☐ If you have a **stair lift**, regularly **check the batteries are charged**.
- ☐ **Follow us on Twitter and Facebook** so that you can keep track of updates during a power cut.
- ☐ If you are working on a personal computer. **Save your work regularly** or consider investing in an uninterruptible power supply.
- ☐ If you have a **paraffin heater or gas lamp**, make sure they are **serviced regularly**.

Page 3 In a power cut, call **0800 195 4141** tweet **@ElectricityNW** facebook **ElectricityNorthWest** or visit **enwl.co.uk**

Figure 24: A powercut checklist, ENW



What to do during a power cut

If you do have a power cut, here are some simple tips to help you stay safe until we can restore your power:

Keep updated

- Use an analogue or mobile phone to call us about your power cut and ask to be kept updated.
- Follow us on social media for regular updates.
- Stay tuned to your wind-up radio for news and weather updates.

Lighting

- Use a torch rather than candles, paraffin or gas lamps.

Heating

- Keep warm – wear extra layers of clothing, including hats and gloves and use blankets for extra warmth.
- Be careful when using alternative methods of heating. Don't move paraffin heaters when they are lit.

Protecting your food

- Keep your fridge and freezer doors closed. Frozen food should last up to 12 hours without an electricity supply.

Appliances

- Switch off any electrical appliances you were using before your power went off.
- Leave at least one light on so you know when your electricity has been restored.

Fish and reptiles

- Unplug filters to avoid the build up of toxins. Clean filters before using them again.
- Place a blanket over your fish tank for extra insulation.
- Disturb the water surface for five minutes every hour during a power cut.

Personal computers

- Limit the use of your laptops, smart phones and tablet devices to save battery power.
- Turn to low-power mode, or reduce the brightness of the display to prolong battery life.

Solar panels

- Solar panel systems should have a 'no volt' disconnection capability which will operate automatically when your incoming electricity supply is lost.
- If you are in any doubt, switch off the system during a power cut.

Neighbours

Please always check on elderly or vulnerable neighbours, and let us know if they need extra support.

Page 4 In a power cut, call 0800 195 4141 tweet @ElectricityNW facebook ElectricityNorthWest or visit enwl.co.uk

Figure 25: What to do during a power cut, ENW

In addition to the increased use of social media, since the blackouts during Storm Desmond, Electricity North West has created infographics about how to prepare for a power cut, as well as what to do during a blackout. Figure 24 presents a checklist of how to prepare. The list is full of juxtapositions which highlight the vulnerability of certain technologies during disruption. For example, the checklist suggests having the contact details of the company stored in a mobile phone, yet the next point states the need for a landline telephone. The use of landline telephones was highlighted by participant interviews, for example Susan, who has now bought telephones for all of her key staff. In Lancaster, student estate agents have also provided tenants with an 'emergencies kit', consisting of a torch, radio and candles.[131] Despite the list highlighting how digital forms of communication 'follow us on Twitter and Facebook so that you can keep track of updates during a power cut' are key to being able to prepare for a power cut – the act of preparing does not involve a consideration of how these acts will be sustained during an outage. Additionally, information through these platforms is often delayed and inaccurate when used in the moment. Edgerton views maintenance as a mixture of 'old' and 'new' technologies (2011). In order to be more prepared for a power cut, the

[131] Personal correspondence.

merging of perceived technologies occurs. A number saved in a digital mobile phone, but an analogue phone is required if there is a need to notify others about the blackout.

The need to rely on external sources of energy 'battery powered or wind-up' to power items normally connected to mains supply, as well as the need to keep 'paraffin heaters or gas lamps' serviced regularly, shows the need for practices of repair to be built into the everyday. Another point which highlights the importance of memory and past events on forming the future is that the need for a radio during a power cut, viewed as being useful in order to listen to weather updates. Severe weather may have been the cause of the 2015 blackout in Lancaster; however, the checklist makes no reference to other forms and reasons for power cuts that may occur.

Figure 25 again places Electricity NorthWest as central to understanding what is happening during power disruption. Repeating the points established in the preparation checklist, the image contains a section on 'Keeping updated'. Through repetition of the points made, the infographics demonstrate that the act of preparing for disruption is vital to being able to be resilient. It highlights how understanding of the system beforehand is viewed as being the key way to 'stay safe' and withstand disruption. If the suggestions presented on the infographics are taken as preparations for a 'near future', they demonstrate the need to make future scenarios recognisable and plausible. Through presenting a possible power cut in a similar narrative of what has been experienced by those in the North West of England previously, such as poor weather and the breakdown of digital communication networks, these tips for greater resilience do not engage with the ideas of change that perceive the future to be different and unknown. The time placed on the length of a potential power cut is not noted, but by giving information about the amount of time food can be kept in a fridge without power infers that the company believes that at a power cut is unlikely to extend beyond that time. As Storm Desmond showed, this is not always the case.

In this instance, future power cuts are anticipated as an event that will be similar, or less disruptive, compared to a previous event, but requiring similar practices to those already in place. This may be a successful model for one type of blackout in the near future, but it does

not account for multiple futures. In only looking for short term solutions, communicating maintenance can be viewed as an act which needs to be constantly adapted during times of perceived calm. Only future disruptions can highlight what is needed or missing from current modes of resilience. In communicating maintenance of the current system in place, it should be noted how immediately after the three-day week in 1974, maintenance was viewed as a private act within the home – individuals making changes. In the case of Storm Desmond, private companies became public with their repairs and amendments of the systems which they manage.

The checklists are only available online; there are no physical copies of the documents available to the public, unless they wish to make a copy themselves. Although many participants who were interviewed stated that they were more prepared for a blackout to happen in the future, 'I know what will happen now and what to do', they believed the blackout would only happen again in a similar circumstance yet a future is being imagined where in the event of a blackout there will be access to digital networks that were not present during Storm Desmond. The set of interactions between past and present demonstrates again how these acts of maintenance contribute to an everyday resilience, but this is still an idealised and dysfunctional form of sustaining through disruption.

Through communicating acts of maintenance and preparation, narratives of the future are created in varying spaces to demonstrate the importance of what has come before. They are also used as a stressor for keeping institutional structures in place. Electricity Northwest is able to present a scenario of a blackout which benefits them – one which places the emphasis on the actions needed to prepare, experience and survive a power cut remaining the same as they were previously. They also involve the added dimension of constant connection to the company if an individual needs help. Those who repair and restore are the maintainers who keep systems running when there is no disaster and they only become visible after the point of breakdown. Their acts of maintenance are now used as a PR tool to emphasise the need to connect with private companies. However, as the next section addresses, after both case studies a new act of maintenance was created through emergency plans.

6.5 Action for the Future? The Emergency Plan as a tool of Maintenance

> 'The lessons that we should be learning from this emergency'.[132]

The 'lessons learned' narrative that is often used after events, was already occurring before the imposed power cuts in 1973. On 17th October 1973, one Member of Parliament opened his question to the Prime Minister by stating the need to learn from the disruption that many in Britain were about to experience. The phrase 'lessons learned' suggests that there are things states, publics and individuals need to be taught from the past, without the suggestion of action in the present. In both cases of 1974 and 2015 lessons learned instigated action. Although short-lived, both events had an impact on the actions of those who experienced the disruptions, not only through small acts of maintenance in the home, but also through the restructuring of modes of governance during moments communities perceive themselves to be in crisis. There is a demonstrable shift from 'governing through resilience' (Sircar et al, 2013) to governing through maintenance, asserting power through the need to maintain the systems in place when disruption is not occurring, rather than when breakdown happens. Whereas publics were perceived to be slower than those making policy decisions through the top down structures of communication, after the two moments of disruption explored in this thesis, communities took it into their own hands

When a State of Emergency was called in October 1973, the Act set in to motion a restructuring of local government. In 1974, boundaries of local authorities were brought together with various public and emergency services, 'civil defence', peacetime 'emergency planning' and internal state security in a single hierarchical system called 'home defence'. The main concern of this system was to counter and aid resilience to all forms of civil unrest, from strikes such as that of the NUM to a risk of nuclear war, with threat of disruption on all levels viewed as ever-increasing and more dangerous to the continuation of the quotidian. These plans involved replacing central government with a system of regional government. In 1976,

[132] Hansard 17th November 1973.

Cumbria (with Windscale Power Station central to its economic ecosystem) was the only authority to test its civil defence plans. These plans viewed a power cut and long blackout as being connected to multiple dangers– potentially due to the numerous factors that had caused rolling blackouts and the rationed use of energy in 1974.

In order for future blackouts to be understood and the level of disruption prevented, as well as being central to policy making processes, they have to be understood, trusted and viewed as relevant to experts and non-experts alike. Loss is not viewed as a threat, this presents a challenge as electricity is so constant in the UK. Storm Desmond took managers by surprise. The Energy Manager of Lancaster University stated 'we were not prepared for the event, it was not even considered as a threat'. Lancaster City Council now views a 'total blackout of up to 3-5 days due to loss of the National Grid' as a high-risk event. In practical terms this means that there is a chance that a power cut will occur on a similar or larger scale to that experienced during Storm Desmond (Lancaster District Emergency Plan). Restoration and repair are predicated as three days but if there is damage to the network, (for example due to extreme weather) this timescale could be extended up to 5 days.[133] As with 2015, backup generators are available for limited time for some vital businesses and emergency services. A loss of life support machines, civil unrest, no alarms, street lighting, gas heating, rail transport, water supplies and mobile telecommunications is anticipated.

These timescales and events do not correlate with the ideas of power cuts suggested by Electricity NorthWest, who only provide simple points of resilience. This disjuncture between expectations of the future with practical predictions has created the need for those who experienced the mismatch of ideas and whom held responsibility first hand during the Lancaster blackout, to take responsibility for their own communities. Neither Electricity NorthWest nor the council coordinated resilience in a way that took full responsibility for all of those affected in Lancaster. As a result, residents felt the need to create their own mechanisms of resilience. Since Storm Desmond eleven community emergency plans have

[133] http://www.lancashire.gov.uk/media/224827/Community-Risk-Register.pdf

been devised as a result of the increased understanding of risk in the area.[134] The communities which have emergency plans in place are nine villages and small towns on the outskirts of Morecambe and Lancaster as well as the Ridge Community Centre and St Thomas' Church in Lancaster. As of October 2018, six plans are available online and accessible to all. The plans 'make use' of the blackout, citing the effects of Storm Desmond on and in the community as a key reason for the development of the plans, 'there is no statutory duty to participate but the community saw it as a positive step to take in improving their resilience after the recent flooding and electricity failure'.[135] The voluntary work involved with the plans is not viewed as a transfer of the labour and work required by the council, but a way of continuing to create a community, 'a positive step' in improving resilience for the future.

This study shows that there are 'systems' that are mobilised, the emergency plan can be viewed as a responsive, ever changing tool used to create better futures that involves publics in creating new infrastructures and systems. Within the creation of the plans there is an acknowledgement that 'community resilience will be something that many people and groups will already do'. But the need to create a physical tool that connected these groups 'work together with agencies, businesses, community groups and individuals to establish a community network and develop an ongoing process of using and enhancing relationships that will build resilience within the community' to create an even more resilient public.[136]

Anticipating the future and its effects on a community by harnessing the infrastructuring processes that created the systems of governance, mobilisation and resilience that were used during Storm Desmond is presented as more effective in preventing further 'decay' of the system, which is not only the network itself, but the publics that came together during Storm Desmond. These imaginaries, the coming together of residents, the threat of further disruption as seen during Storm Desmond help stimulate the development of politics that

[134] (Borwick & Priest Hutton, Carnforth*, Caton & North Quernmore*,Halton with Aughton*, Nether Kellett*, Over Kellett, Ridge Community Centre, Silverdale, Slyne with Hest*, St. Thomas' Church Lancaster, Warton* * = *Community Emergency Plan published and available)*

[135] http://www.carnforthtowncouncil.org/assets/carnforth-ep-version-0.4-111216.pdf

[136] (http://heatonwithoxcliffepc.org.uk/recent-news/community-emergency-plan/

might help realise those aspirations. Residents are able to engage with sociotechnical imaginaries through planning as well as creating potential futures and ideas about coping in future scenarios.

The plans do not completely remove the communities involved from the governance of the distribution company and the council. In the event of a blackout and an electricity supply failure the plans state that residents should ring Electricity North West control centre in the usual way to report the problem. This allows the Control centre to assess the nature and scale of the breakdown. If it becomes apparent to any members of the community that the power cut is widespread or likely to become protracted they should convey that information to a Community Contact to consider what action is necessary to support the community, particularly any vulnerable members and whether to activate the emergency plan. The City Council Duty Emergency Incident Officer (DEIO) should also be contacted, via the Council's Emergency Call Centre. If it is necessary to contact the Electricity North West Limited Emergency Control Centre Manager for further information the DEIO will do this on behalf of the community. The plan as an artefact, examines the 'practices through which specific ordering devices are materialised, mobilised and contested' (Suchman, 2007: 187). Though still requiring the resilience 'instruments' (Easthope and Mort, 2014) that were already in place before Storm Desmond, there is a need for 'official' governance – the communities do not become autonomous and self-sufficient, they still require connections and influence from those perceived to have access to the physical connections to the power itself. Another group within this narrative of resilience is the Plymouth Brethren, a group of the Christian church. Listed as the 'rapid response team' on several plans, highlighting the traditional institutional structures that are still expected to remain in place when disruption occurs. However, the plans demonstrate a refusal to participate in the re-production of myths, including the 'myth of order' (Graham and Thrift, 2007), by taking responsibility for maintenance into the communities affected. However, whether the plans can be delivered can only be seen when the plans are put into action during moments of disruption.

The Slyne-with-Hest emergency plan places the event of a power cut as high risk, stating the main impact of a blackout as a 'potential risk to elderly and vulnerable adults in private homes

and residential homes due to lack of cooking and heating facilities'. The plan provides notes on 'What can the community do?' such as establish a list of vulnerable elderly to check up on/assist. Creating a telephone tree (again needing fixed landlines to coordinate response and liaise with council and relevant organisations). The importance of local radio is emphasised through the need to have links 'to local and county radio stations to advertise any provision of help within the village'. The plan merges acts that can be considered preparation, with action during disruption, 'contact residential homes to understand their plans/need and open up centres which can use mains or bottled gas to provide hot water, flask filling facilities and hot food/beverages'.[137] This merging of activities that demonstrate an attempt to control the unknown, through making the potential of disruption a known and visible part of the community, presents a future which is inherently connected to its past. A way of transforming the future yet still grounding it in what has gone before, learning and understanding from similar events, highlights the importance of institutional memory and its temporal aspect that hoped to influence 'future generations through their impact on society and the landscape' (Emanuel, 2012: 342), although it is yet to be seen if future publics will benefit from these mechanisms, new systems are formed that strengthen the current infrastructures.

Members of a community are shown as active when disruption occurs. The participants are named in accordance with their role and skills they can offer in an emergency (For example Pete Walton, Chainsaw Owner). The individual naming of actors within the plan brings the community closer together during times without disruption. These highly localised plans are effectively useless outside the remit of their contents as they suggest an insular and close approach to communities and help, based on location rather than need. However, through acting as a plan for a certain group of people, they are tailored to their communities' individual needs. The Carnforth plan involves an understanding of the coastline, whereas the Slyne-with-Hest plans the need to be able to restore transport infrastructures quickly. Delegation of a future passed further onto the individual. Through the need to have connections as a mode of resilience individuals build and form new networks, the community

[137] http://www.slyne-with-hest.org.uk/EmergencyPlan.pdf

emergency plans in place in Lancaster are a key example of this. As both the plans and Storm Desmond demonstrate, only those who can access the information have an 'official' understanding of what is required, instead new knowledge and approaches are created that become the modes of maintaining understanding on a level that affects publics dealing with disruption. The experience of using any tool changes the user's awareness of the structure of reality and alters his or her sense of the human possibilities within it (Edwards, 1997: 29).

Whereas Graham and Thrift suggest failures are not planned, with objects and mechanisms designed to impede maintenance, including legal and commercial ones (2007, 23), the emergency plan shapes maintenance in a new way, by deliberately considering a future where failure occurs. Such a world 'reframe(s) how we approach material vulnerability, not as something to be avoided, dismissed or repaired, but as something to think more responsibly (Callen and Criado, 2016: 34). There are many unknowns when considering futures within the practice of the emergency plan. The plan can be viewed as an undesired future, as many of the practices are not required or expected to be carried out in day-to-day lives. As a document it is staged and prepared, but acts more as a tool to prevent than to counteract. The plans maintain the structures that were in place whilst demonstrating that futures are not only local and dependant on certain structures remaining in place, they are additionally messy and need to be managed. Communities increasing involvement in their own speculative narratives allows for reflexivity in the co-ordination of the future.

6.6 Conclusion

Moments of disruption which are a pause of the present, when the order of daily life seemingly goes 'back to normal' after an event, precede and create imaginaries, scenarios and futures. This chapter has demonstrated the ways in which maintenance is not only a form of anticipation, looking forward to moments that are yet to come but that anticipation itself is a form of maintenance, supporting publics to cope if disruption reoccurs. This is true not only for physical infrastructure and systems such as the electric grid, but additionally the publics that are formed, prior, during, and after the event. Maintenance allows power structures to remain the same, yet through maintenance, communities can have an influence on the infrastructures they are part of. Through the influence of a 'blackout spirit', imaginaries

are held back by conforming to the ideas of what has happened in the past. This chapter has served as a way of demonstrating how futures occur immediately after a moment of disruption and how the futures that occur are reliant on the status quo.

Visibility is still an issue, due to the need to inform publics about events that could affect their daily practices but were not demonstrable without the use of the visual. Through highlighting the constant work that is going on to maintain the current system, real change is prevented from occurring. Only when another moment of disruption occurs can more futures be seen and incorporated into further acts of maintenance. Maintenance has been taken out of the domain of the 'expert', those who are technically skilled in fixing the problem and become a more holistic enterprise, through the community emergency plans.

An act of emotional maintenance, everyday resilience, made or honed by crises, equips people with ways of reviving memories and imaginations of living in another way, and creates material coping mechanisms, redundancies that prove vital under duress that are dependent on mobility. The use of the past as a methodological tool is in itself an act of maintenance when looking towards the future, as it demonstrates how events and emotion are all 'freighted with memories of the past and hopes for the future' (Walsham 2017). The next chapter will focus explicitly on the future, looking to the year 2056 and a moment of disruption. It will merge the ideas presented in this thesis so far to explore how futures thinking works when the actions of publics are incorporated in new ways, creating new futures dialogues.

7. Blackout 2056

7.1 Introduction: Generating the future

'Below the surface of daily events flows the endless progress of time in which everything in the universe evolves through an ordered sequence of states towards its final purpose' (Lee, 2012, 1)

Envisioned futures make assumptions about, and have far reaching implications for everyday lives but these are seldom explored (Timms et al., 2014; Strengers, 2013). Throughout this thesis, the future has already existed in the present and attention is drawn to the social structures and practices which are perpetuated and maintained for the future through everyday action. This chapter speculates on how futures may be made in ways that are beneficial to those whose voices are often excluded from official narratives of change and futures thinking. As Anderson (2010) has highlighted there are many ways of thinking about the future. Presented in this chapter is a scenario that considers a blackout in Lancaster, in 2056, created using concepts explored in the previous two chapters, treating these two case studies as an archive of the future, as well as the findings of a scenario workshop that involved those who had experienced the 2015 blackout.

Attention to the future has throughout this thesis been embedded into the case studies. The narratives of 'what comes next', goes against the view that in order for change to occur and have a significant impact, it has to be on a large-scale (for example, revolutions or catastrophic events). Instead this research looks at a smaller breakdown that can be 'restored' and uses it to demonstrate that the maintenance of various power systems is important. Anticipation is integral to change in everyday life and understanding complexity, there are multiple futures for each individual, institution and system.

In order to explore the potentials of a near future in 2056, seeking to build on the ideas of memory and the belief that experience of disruption in the past allowed for greater resilience in the future a workshop was delivered; 'recreating' and remembering the emotions of the Lancaster blackout of 2015, this is detailed later in this chapter. Within modes of future-making there are many 'entanglements of matter and meaning' (Adam, Groves 2007). The case studies of 1974 and 2015 as well as data collected at the workshop is used in this chapter alongside media commentaries, archival sources, social media, reports, interviews and opinion pieces to create a narrative from the future. These are used here in a similar way to the narratives presented about 1974 and 2015 (Chapters Four and Five) by involving those who experienced a similar event helps gain an understanding of how futures are formed and extrapolated from the past and present, whilst highlighting possible futures. Blackouts offer a power paradox. In order to eliminate blackouts, a stable grid is needed at all times. With the shift to renewables this stability does not exist as energy production becomes dependent on weather conditions and battery storage. A scenario with a constant threat of blackouts opens up conversations about governance, security, energy practices, climate and social lives that could be seen as suggestively dystopian in their form. As a well-established tool of futures thinking, the narrative developed in this chapter represents a 'scenario space' of some of the many possible futures that could emerge, depending on the emphasis placed on different ecological, socio-political, technological and economic changes.

Considering a 'long range' future (Masini, 1992: 32) explores how those who have experienced the event will partake in what comes next. During the 41-year interim between 1974 and 2015, publics were formed using memories of infrastructure disruptions past and changes to policy utilized these impacts. For this reason, the chapter uses 2056 as a fixed future point, 41 years after 2015. Dator specifies the need to be transparent when practitioners refer to 'the future(s)' (2002: 16). Masini (1993) defines future time frames as short-term, medium-term and long-term futures. Groff and Smoker (2015) present future time frames by adding two new categories: the 'future' as near-term future (present to 1 year), short-range future (1 to 5 years), middle- range future (5 to 20 years), long range future (20 to 50 years) and far future (50 years and more). Using 2056 as a fixed time horizon in this chapter enables a discussion of the maintenance that will be projected into the future. The

concept is revealing as it can highlight threads from previous moments of disruption, such as 1974 and 2015.

Investigating different futures thinking in relation to a blackout in 2056, the chapter takes a local small-scale scenario that highlights how the multiplicity of power, central to understanding change, is important and needed within futures thinking, where the complexity is an under-researched area (Fergnani, 2018), regardless of whether it considers the everyday life of the lay public. Often, new systems and their impact in transforming societies are central to future scenarios. However, within the four decades between the 2015 blackout and the 2056 scenario, as well as developing anticipations of 2056, the idea that there will be a radical overhaul driven by innovation should be exercised with caution. To suggest technologies are enabling new forms of practice ignores the maintenance of the system which enables development. The electrical networks, as well as the power structures in place in communities are historical and transforming entities. To meet carbon policy goals and the Paris Agreement goals, there needs to be radical transformation. This chapter relates to these issues by understanding how the characters of futures are shaped by pasts and presents, taking disruption as the focus of the event once again. Climate goals set 2050 as the year by which targets must be met; setting the scenario in 2056 demonstrates a possible future after this point.

Projecting a transformative societal change that challenges existing assumptions for problems of significant complexity with a long enough time horizon to allow for making determined choices is the key role of futuring techniques such as backcasting (Porritt, 2013), used to identify signals of change and also to determine short-term planning and policy goals that might facilitate a long-term outcome**.** This thesis does not use backcasting to look to an ideal future and how to get there: it is used to connect the past, present and future differently. Porritt's *The World We Made* presents an analysis of key events and changes that occurred during the scenario to reach the year 2050. Written from the perspective of a history teacher (born in 2000) the text presents short illustrated snapshots detailing the previous decade's social, political, economic and technological developments, detailing an agenda calling for a sustainable world. Porritt starts from a 'good' desirable future and uses the method to explore

how to get to this point. The scenario presented here is not what would be considered ideal within a backcasting framework, disruption is still occurring, people still have to adapt to external pressures. The connection of 1974 and 2015 to 2056 is an element of the technique that will be adopted in the scenario.

This chapter serves as a way of appreciating the historic contingency in the multiple dimensions that the 2056 scenario encompasses. However, such extrapolations may ignore changes in the relationships between components in the near future and how these disrupt linear pathways. Whereas Geels and Smit (2000) note that anticipated growth and innovatory practices are envisaged and only developed to a certain extent, often changes in expectations correspond to particular constitutive moments. The fact that similar predictions have been made every decade or two (Urry, 2016) highlights again the need for maintenance as a vital practice of not only creating the future but enabling future scenarios (Geels, 2000: 874-6). Innovatory practices are often the scenarios that are pushed to the forefront of futures thinking. This chapter does not serve as a way of thinking 'how do we get to a situation where there are no blackouts', such a viewing of power as an all or nothing factor of day to day life is not viable, people are busy trying to build power. Instead, vignettes are used to suggest how change might impact on the ways power exists during moments of infrastructure breakdown. This is demonstrated through a shift in responsibility, seen previously in both the case studies of 1974 and 2015, or by shifting approaches to maintenance. By briefly introducing futures of potentially emergent systems, setting out new ways of being, not to be judged by the extent to which the scenarios 'get the future right' (Candy 2010), but solely by the extent to which an exploration of futures enables us to perceive the present in a new way, leading us to ask more questions about the nature of power and change.

Thinking about the future in this way is important, as it brings together not only the linear structures of past, present and future, but also small localised futures, which are too often ignored in grand scenarios of utopian or dystopian visions. In the workshop held to visualise 2056, the use of a particular type of constructed object – maps – was used as a tool to enable dialogue in groups, allowing participants to connect together past, present and futures; to build new stories about futures, and to put themselves, as well as their past experiences in

the picture. Building on the infrastructure mapping introduced in Chapter 5, a dialogue was created about the nature of disruption and power in the future. The need to pay attention to 'the role materials and spaces play in shaping collaboration and knowledge production' (Pang, 2010: 31) has become a central part of futures studies (Curry: 2010). Through exploring a scenario that utilises both space and material elements, the workshop sought to think not only about future disruption, but additionally to bring production into scenario planning methodologies. In this thesis, the scenario is driven by practice-led research that invites members of a community to use an established problem, to intervene and produce an outcome using their own knowledge (in the next section, this creation of an experience of the future will be explored).

Scenarios are plausible, challenging and relevant stories about how the future might unfold (Hunt et al. 2012), using them as method allows questioning of what can happen, what will happen and how can we get there. Such scenario work in relation to infrastructures is already in place; however, their involvement of the public not only in the narratives and outcomes they suggest but additionally the creation of the scenarios is non-existent. One example is the report 'Pathways to 2050', produced by the UK's Department of Energy and Climate Change (DECC 2010), which claims to explore future energy needs and identify ways in which these might be met through the adoption of a low carbon energy system. The social is not incorporated into its analysis, taking current practices for granted, the document assumes a continuation of current standards and high electricity use with increasing dependence on power. The scenarios that are presented are addressed as issues of supply, but do not acknowledge the social aspects of daily life, including users actually going about their daily practice within these frameworks. The futures workshop was specifically designed to incorporate attention to social practices and social structures into ideas of power futures. This is something that Jasanoff and Kim contend that new energy futures will need 'to reconfigure the physical deep structures of civilization—grids and pipelines, seashores and pastoral landscapes, and suburbs and cities—that were shaped by the energy choices of the past' (2013).

Another such report: 'Generating the Future: UK energy systems fit for 2050' has no mention of the social or blackouts when considering the shift in systems.[138] Although the scenarios will also have serious resilience issues, with around 40% of the electricity supply coming from intermittent supplies in each presented scenario, the system would be moving into new territories not currently encountered in simulation or in practice. The report notes that it is unlikely that the overall scale and appearance of the system will change to any great degree given the same level of demand; this again highlights the importance of presenting a scenario where maintenance is at the forefront as a key theme. Written from an electrical engineering perspective, the report concludes by stating the 'huge impact on the public' through lack of electricity. Once again, the role of the everyday in energy scenarios is ignored, suggesting that publics will not be involved in the creation of future presents; rather the future will happen to them. The scenario explored in this chapter argues the need to incorporate publics into the creation of futures, to understand the way in which people not only act on what is to come through maintenance (See Chapter 6), but additionally the way that they think about futures as well in the present. The next section will detail the method employed to do this and explore how to go about futures thinking in a way that considers new methods on how to engage publics.

7.2 The Scenario

Scenarios, stories describing different but equally plausible futures that are developed using methods that systematically gather perceptions about certainties and uncertainties (Selin 2006). When researching the future, no one method is appropriate in isolation (Blass, 2003). A mixed method approach enables envisioning and imagining futures through exploration and critique. Combining all cases explored in this thesis to paint an image of the future requires a way of bringing together scales and publics that would not normally be in conversation with each other. Scenarios in this way 'build shared images of possible futures' and 'nurture openness to change by allowing more complexity in futures states of a system and the environment to be considered (van der Heidjen 2004) This section will address the methodology of undertaking such a task. They are organised efforts to imagine future

[138] https://www.raeng.org.uk/publications/reports/generating-the-future-report

conditions which are used to challenge existing perspectives and or/plans (Schwartz, 1996; van der Heijden, 2005) these can then be deployed to counter group and individual decision biases (Schoemaker, 1993). In scenario practices the future is explicitly treated as a safe conceptual space, operating at a higher logical level than the present (Normann, 2001), in which it is possible to safely consider how to act from the present into the future, they act as a transitional object or space (Amado and Ambrose, 2001), with the 'future' being an abstraction of possible that allows back-casting from 'there and then' to 'here and now' in ways that make sense to the publics they involve. Scenarios allow us to be explicit about assumptions within scenario work (as Walton (2008) initiated) as well as time, contexts and action. Bringing scenarios and futures literacy together enables future sensemaking to prioritise our assumptions regarding temporality, choice, and agency. Challenging assumptions in this way presents new knowledge in the present moment, a reformulation of what was believed to be true about what is yet to come.

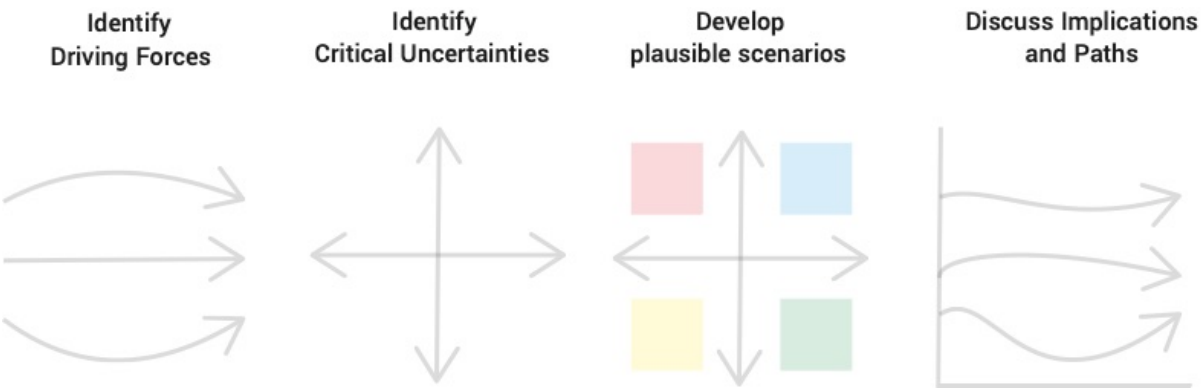


Figure 26: The Scenario Development Process

The traditional scenario development process (figure 26) involves four stages. The first is identifying driving forces, the shifts in society and daily life that will be important in the future. In this thesis these are, a shift in governance, the impact of climate change, an increase in the events considered to be disruptive and the importance of maintenance. Then, two of these critical uncertainties are taken to form an axis of a matrix, drawing four possible scenarios for the future. The various implications and impacts of each scenario are then considered, with goals, considering each pathway. Within complex contexts, there are multitude of possibilities, focusing on two major uncertainties avoids paralysis. Whilst developing four plausible scenarios provides options for dealing with the same issues, it is not about choosing

one future. Scenario work increases in times of crisis (Wilkinson 2009), 'sensemaking' theories (Weick 1995, Weick and Sutcliffe 2001) create plausible understandings of a shifting world. This is the role of scenario in this thesis, to enable publics to have a better grasp on what is going on in their environments, creating better futures through having a greater understanding of all the factors that produce futures.

Scenarios are ‘used’ by different publics to explore futures in the present. Designed to help groups and organisations attend to different forms of 'depth', e.g. structural drivers of change and/or cultural perspectives is essential when scenarios are developed for collective sense-making purposes as a means to establish common ground and forge the new and shared vocabulary for more inclusive strategic conversation. (Jackson 2009). As Chapter Two demonstrated, these have different aims and objectives for each group they serve. For example, strategic foresights commercial use presents ways in which businesses can become more successful, through a greater understanding of the complex web of actors that form the environment they operate in. Becoming creative with the methodology here allows for publics to view the same scenario in different ways. This approach is not without its issues, and we are faced with the grit and friction of combining methods in a new way that goes against standard foresight practices Why does this thesis present only one scenario? After all, if a scenario was to incorporate all critical uncertainties it would be massive. The scenario in this thesis focuses on the ways in which the uncertainties have been formed in the case studies, as well as the future-making workshop. There is a need to highlight past events in to illuminate what is perhaps obscured by current practices, formed by long standing political regimes and personal habits. A futures matrix is presented later in this section to detail the ways in which four scenarios could have been developed. However, combining the potential narratives is provocative. It confronts different groups with a complex, difficult, presentation of the future that places actors as having different responsibilities. It creates a shared understanding of the future that may be uncomfortable, but demonstrates how publics, organisations and governance cannot ignore that their futures sit alongside others. These may have different outcomes and implications, but without this antagonism, the pathways will continue to foster ignorance.

The scenario additionally presents how increased public literacy and an increased understanding of the character of futures as they are shaped by past and presents can create better futures. Looking forward to a future disruption and considering how 'future-making' after events shapes futures in action can only be successful if a scenario includes more than two key 'critical uncertainties'. Figure 27 presents how critical uncertainties shape a future scenario relating to disruption. Each point within the critical uncertainty map raises questions that need to be addressed in a scenario, regardless of which part of the axis it represents. By combining them into a new singular scenario and presenting one trajectory from present to future can be said to ignore complexity, as there is no test to see whether the perceived path will be the one that comes into fruition. The local scenario presented in this chapter creates a way of understanding the future, yet it acknowledges this complexity through combining multiple elements. Bringing together plausible scenarios into one means that the problems are not reduced in complexity to fit the scenario, and instead acknowledges that social situations and how publics are formed during disruption are no 'problems with definite solutions; processes to be optimized' (Morozov, 2013: 23). Instead, the scenario is layered to incorporate multiple processes.

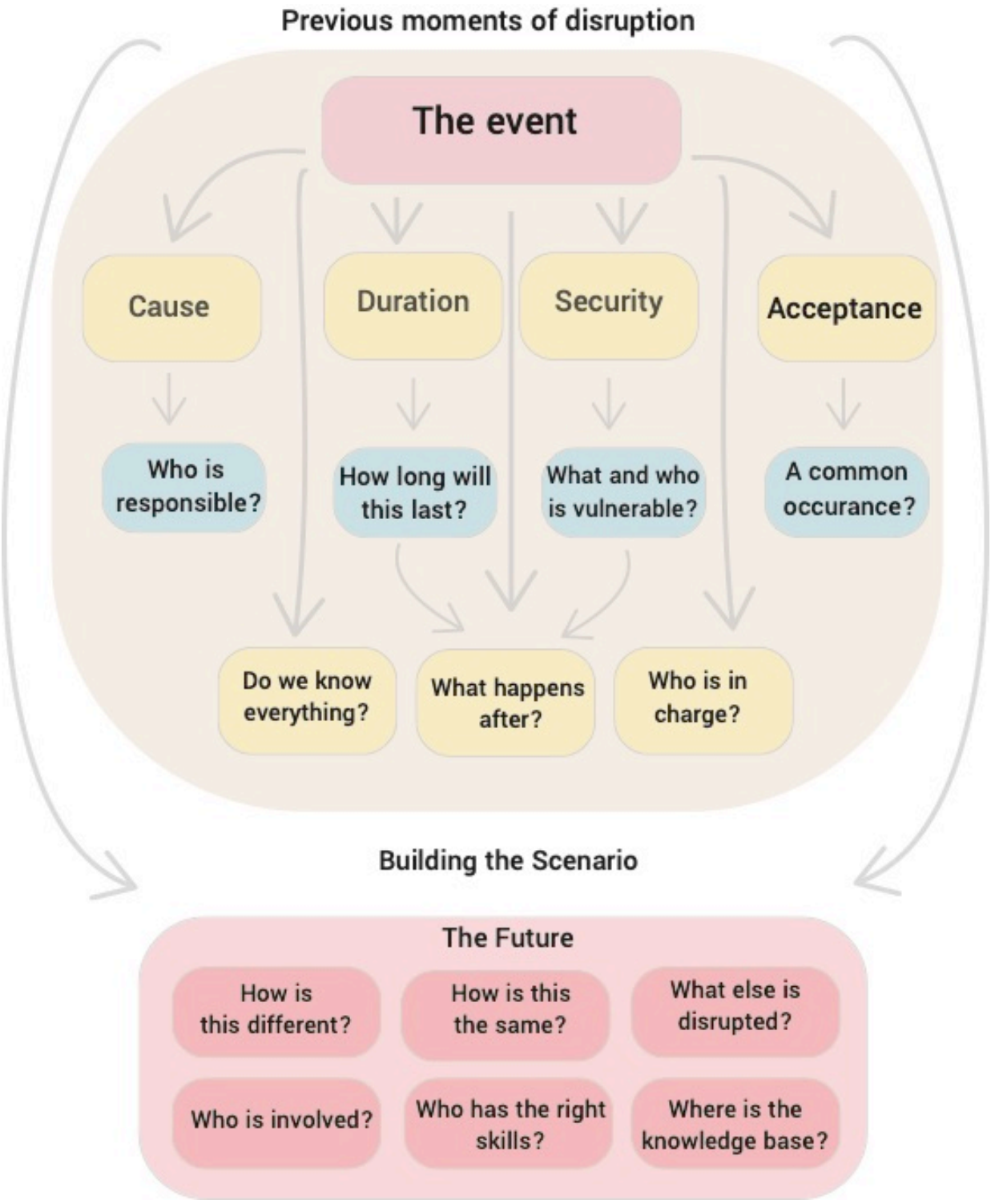


Figure.27: Critical Uncertainties of Disruption

7.2.1 1974 and 2015: Case Studies

The trajectory of futures thinking has parallels with the case studies and timescales of this thesis. In 1974, the future was viewed by policymakers as one which needed to be less reliant on electricity. So, began a shift from corporatism to neoliberalism. Energy is not linked to one specific economic model; rather, it has been used as a catalyst to push agendas. The development of scenario planning began when the oil company Shell developed the scenarios method in order to identify a significant threat to oil supplies.[139] Thus began the oil crisis that provided a catalyst for the problems in Chapter Four. Son (2015) regards the current trends of futures thinking to be part of the 'neoliberal view'. Suturing techniques consist of strategic forward-looking analysis of socio-technical systems conducted for the purpose of identifying promising areas of research and development to plan investments (Son 2015). As the case study of 2015 in Chapter Five demonstrated, this neoliberal thinking about the future was already in place in the community affected. Even though those experiencing the event were not professional futurists, they placed present and future responsibility on various stakeholders. This shift can be seen in the contrast of responses to disruption in Chapters Four and Five.

The events explored in the previous chapters present not only potential archives for the future but are the foundations of the ways in which publics relate back to past events when disruption happens once more. Much of the archive is lost amongst stories that are more prominent and vocal. As an archive for the future, the meanings of past events can never be fixed. Spiegel notes that revision of past events is equally social and psychological in its elements, creating a shift in consciousness (2007: 19).

Fragments from the past are dug up and pieced together; the malaise felt towards Government in 1974 created nostalgia in subsequent. An experience from in the past is a way of experiencing the present. Foundations built upon yet covered by things considered to be

[139] (https://www.shell.com/energy-and-innovation/the-energy-future/scenarios/new-lenses-on-the-future/earlier-scenarios.html)

more important, leaving these emotions and memories buried yet still present. Since the Oil Crisis, the role of the consumer in minimising disruption has become critical. In 1974, the development of thinking about reducing electricity use both nationally and individually, began a shift to placing the individual as the most important actor in facilitating change. Energy saving schemes in 1974 viewed the home as the place where changes in societal attitudes to power began. Culturally, this was also the case, as demonstrated by citizen's responses to power cuts and associated people during this time.

Moving forward to 2015 and the Lancaster Blackout, the practices of the past formed the future when disruption occurred. In order to be resilient to the effects of no electricity, objects that are no longer used every day became objects that were vital within the everyday. The expectation that further blackouts will happen again, through both climatic events as well as man-made failures as a result of lack of maintenance saw the creation of community emergency plans that allowed residents to create a vision of the future that differed to their lived experience of 2015. Although the extreme weather of 2015 was not connected to climate change and the everyday consumption of electricity by participants, through these plans, the future became even more localised and personal, with named individuals and constant revisions taking the place of what might happen in the near future. The responsibility of the individual was highlighted as being vital in being resilient to change, when residents needed to find their own ways of being resilient to power cuts. After the event, through maintaining community connections created during the power cut, the emergency plans became a system of anticipation. If a power cut was to happen again, there was a belief that changes happened so that disruption would be minimal. Preparations 'for next time' and 'in the future' are regular turns of phrase used in the archives and interviews used in this research.

Using these case studies, a scenario of future blackouts in this thesis needs to highlight the power moves between the individual and State, involving a discussion of governance. The vision of blackouts in Lancaster 2056 as a common occurrence in everyday life when there is extreme weather or disruption to the national grid, needs to additionally highlight the

importance of memory and past events in its narrative, incorporating maintenance of the past into the narrative, whilst being adaptive and creating new calls for maintenance.

7.2.2 2056: Workshop

Publics have been the key agent of this thesis, their input the main driver of change. In order to integrate publics into the future, the research required a way of creating further dialogue with communities was needed in the research. An important aspect of design fiction (Lindley and Coulton, 2015: 210) a futures orientated practice that explores, criticises and creates possible futures by creating scenarios narrated through designed artefacts, is storytelling. The world that the story suggests (Malpass, 2017) is often constituted by a constellation of artefacts and different media, including text, videos, illustrations, photography, and physical prototypes used in combination to suggest possible worlds and alternative everyday experiences. Both critical design and design fiction (as well as other types of speculative design) suggest possible near-futures that disrupt the mainstream idea of normality but are still close enough to the present to be relatable and therefore debatable (Mitrović, 2015; Tonkinwise, 2016). In Chapter five, several interviewees spoke about how their experience of Storm Desmond and disruption in 2015 was 'made easier' because they were alive during the blackouts of the 1970s. Chapter four includes letters to newspapers that put individuals' ability to withstand the energy crisis and threat of power cuts down to their resilience during World War Two, which enabled the public to endure the disruption.

The workshop that was held in May 2017 sought to put the participant back into that moment of disruption, by having them experience a blackout. All the natural light was removed from the workshop space by using blackout blinds to block out light. All electricity was removed from the room and instead light was provided – as had been the case in previous blackouts – by camping lights, battery powered fairy lights, torches and LED candles. Board games, one of the activities that had been vital to many for withstanding Storm Desmond, were laid out on the floor and a radio was programmed to play extracts of the Bay Radio broadcasts that had provided information to Lancaster during the 2015 blackout. No prior sign-up to the workshop was required; participants were recruited from when they entered the space – with no age limits. This decision was made as it was most like the experience of a power cut, being

aware in advance of a power cut was not the case during Storm Desmond in 2015, nor were planned rota disconnections an occurrence in 1974. Although individuals hold some knowledge about the threat of a power cut, experiencing a blackout is often sudden. Participation in each activity was voluntary, if individuals wished they could simply enter the space. As chapter five demonstrated - the ability to leave the disrupted space was an act of resilience for many during Storm Desmond. The space of the workshop was a tool in itself in helping people understand and connect past and present experiences to the future.

The workshop considered how electrical blackouts had been experienced in the past and looked forward to how they might be experienced in the future. The initial question of 'what would you do differently' was used to encourage a conversation about change. Two activities were in the space, object 'accumulation' and infrastructure maps. 'Object accumulation' required visitors to the space to think about the objects they would need to live through more continuous disruption and a blackout in the future (2056). Throughout the day, post-it notes were added to a board to create an inventory of objects which would help them to endure the blackout. 38 objects were deemed to be necessary (see Appendix 5 for full list).

Many of the objects were everyday items, commonly used to cope with today's blackouts. Others, such as a thermal bean bag are not so much part of the present. Although the Post-It note is a tool used heavily in design thinking, as an object for ideation it does not represent the complexity of the design process. However, they were not used in this workshop to capture the 'immaterial' aspects of design and were used as a way for people to quickly highlight the material aspects of their futures during disruption. Other objects could have been provided in the space, however the lack of other materials (aside from pens, paper and post-it notes) was a decision made to reflect the materials that may be easy to hand for individuals during an electrical blackout. Candles and torches were used in the workshop and from the ideas shared by participants it was clear that their importance in helping individuals withstand the future was high. An issue central to Lancaster's future blackouts was the need to build a new substation on a hill. If the substation which provided power to 60,000 homes had not been so close to the river, the flooding would not have occurred. Participants clearly

believed that a blackout would most likely occur again because of flooding and not for generation reasons as had been the case in 1974.

The space can be considered to be a 'futures literacy laboratory' (Miller 2010). Miller (2018) details the sequence of futures literacy laboratories as an action learning process;

1. **Participants experience and become explicitly conscious of how the future plays a central role in what they perceive and pay attention to in the present.** At the workshop, the use of the 'dark' as a future moment meant that the future was visible, connected to the present and enabled participants to perceive the current situation as one where disruption could easily occur.

2. **By changing the way participants 'use-the-future' they start to realise they can anticipate in different ways and imagine different futures.** At the workshop, 'using the future' involved thinking about the space they were in, but additionally how they have used the previous moments of disruption they experienced.

3. **By bringing together multiple insights participants begin to under-stand that imagining different futures changes what they could see and do in the present.** The workshop saw people from different economic and social backgrounds form ideas about the future. This included council workers, academics and children. However, for the future building, the social status of participants was not important. The workshop focussed on not creating a hierarchy, rather the ways that infrastructuring creates new publics through communities.

4. **By imagining different futures participants become aware of their own capacity to invent the underlying anticipatory assumptions that shape them of-necessity fictional descriptions of the later-than-now.** The workshop highlighted individuals' role in being part of a public and the assumptions they hold about how disruption will happen, such as an electrical blackout only happening due to flooding.

5. **Through engagement in the knowledge co-creation processes of the laboratory, participants begin to acquire the capacity to design collective intelligence process that enables them to choose why and how to anticipate, contributing to the acquisition of the skills that make up Futures literate communities** This was demonstrated by the use of maps, comparing and contrasting them with others at the workshop.

The infrastructure mapping was designed to build on the activity undertaken during focus groups conducted in Chapter Five. Participants were asked to draw Lancaster's infrastructure of the future and how it would be affected by a blackout. In this activity, the person who will eventually be participating in a future scenario through the design process is given the position of 'expert of his/her experience' (Sleeswijk Visseret al., 2005). The space itself required participants to instantly become resilient as they had to complete the activity in the dark, with only the dim lighting of the LED candles and camping lamps. Throughout the workshop many people entered the space and discussed the future with others– even strangers. The workshop space included two tables, each with four chairs allowing only 8 people to sit and draw their maps at a time. The communication about blackouts with strangers was a process many equated with the perceived increase in communication with other members of the community during Storm Desmond. Although this experienced physical space supported participants in their work it can be said that the space may not have been able to make participants act in the way that they wanted. However, the environment was not one where the participant was expected to 'act out' what they would do in the future, rather visualise it using a creative drawing method.

As the facilitator, my role was to take a step back and allow participants to experience the place as an event. This is why I chose not to prompt the participants in what they chose to map, allowing them to build on their own experiences. However, the participants needed some encouragement in creating their infrastructure maps. Some members of the group, the public that formed during the workshop, felt that they were not creative enough to 'draw'. By explaining that this was not the only way to map their future those who had not approached the future in this way before talked through their ideas with each other. In

contrast to traditional visioning tools, participants were able to enter the space just to talk about the past moments of disruption, they were not required to create a map. This communication about futures in a dedicated space, with others who experienced the same event in a similar way is an important way of engaging people with futures and increasing their literacy. How we talk about the future is vital to understanding, finding a shared vocabulary and making futures accessible to all can come through discussion. These discussions, as demonstrated at the workshop were not always about high-priority factors within disruption, but the low-level banal aspects of life, needing a cup of tea or not being able to go to school. Through sharing different experiences that have an. Impact on the ways in which participants view futures, stronger publics are formed. Communication as a form of infrastructuring is key to futures literacy. On the table's communities formed, each having their own reasons for joining the space. Their time at the workshop saw them make connections and learn from each other. Even the smallest comments about the future can be revealing and aid understandings of how to create better pathways to the future.

Figure.28: The Workshop Space

Figure.29: Participants draw maps

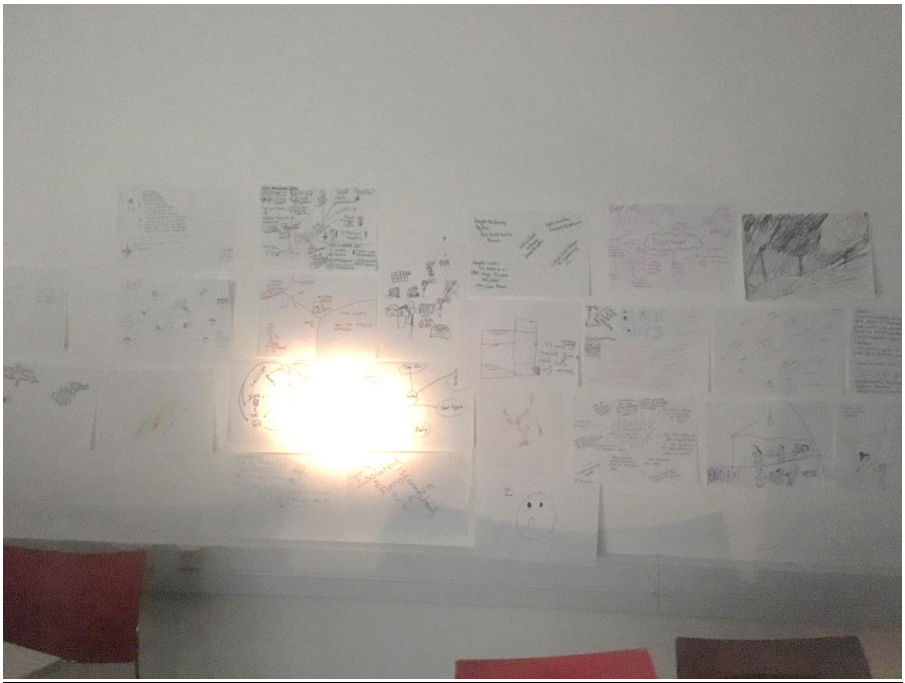


Figure 30: A selection of maps

Figure 31: Board displaying objects of the future

Over the course of the day over 200 people, male and female, aged 3-70, entered the room. Through their shared practice, participants can be said to have created their own 'co-design space', both the experts and non-experts needed to be able to contribute on an equal basis. The term 'infrastructure' initially made some people uneasy as they were unsure what was meant. After explaining the task, they were confident in undertaking it. Another point of confusion was the word 'map' as although mapping practices are central to this thesis, the term and process is not commonly used in day to day life. Due to the freedom given to participants, the maps produced ranged from 'mind maps', spider diagrams that highlighted key issues to pictorial images of how people would live during a blackout. Unlike the experience of Storm Desmond, every participant during the workshop placed themselves in the centre of the disruption, rather than leaving the space as a form of resilience. Some participants suggested that this was because when a blackout occurs in the future it will not be as localised and 'contained' as the 2015 blackout. This showed the awareness that the

threat of power cuts and blackouts was not something that would be unlikely to solely affect Lancaster – it could happen anywhere or everywhere.

Two maps that are representative of the responses are from Charlie, an electrical engineer (Figure 32) and Julie, who lives with her family in Lancaster (Figure 33). Charlie's map presents an image of a town with power where the national grid infrastructure is in place, yet outside this space there is no power. Mirroring the maps presented in Chapter Five of the Lancaster blackout, it develops the idea of a disrupted infrastructure by adding elements of the future to it. There are the traditional policy directives such as investment in generators and batteries, but also an element of science fiction through the idea of flying cars to get to work. Julie's map echoes the idea of solar power, this time through the need for solar charging stations for street lighting as well as in the homes as an emergency circuit. There are no technologically advanced objects in her map, demonstrating her view that the future will not be as far removed from the present as it is often perceived to be. There is a lack of technology such as mobile phones and computers (although they appear in Charlie's map they are not functional during the disruption). Again, this highlights a view that disruption will be similar to that in 2015 – a lack of mobile and Wi-Fi communication when disruption occurs. Both maps note the need for candles, torches and radios, objects that were also present in the 1974 case study. They also highlight the importance of gas for cooking and fires. Government policy is geared towards slowly phasing out this method and so the inclusion of it as a method for resilience suggests that ideas of maintenance within the home space go against the ideas of innovation that the state project.

Figure 32: Infrastructure of the Future

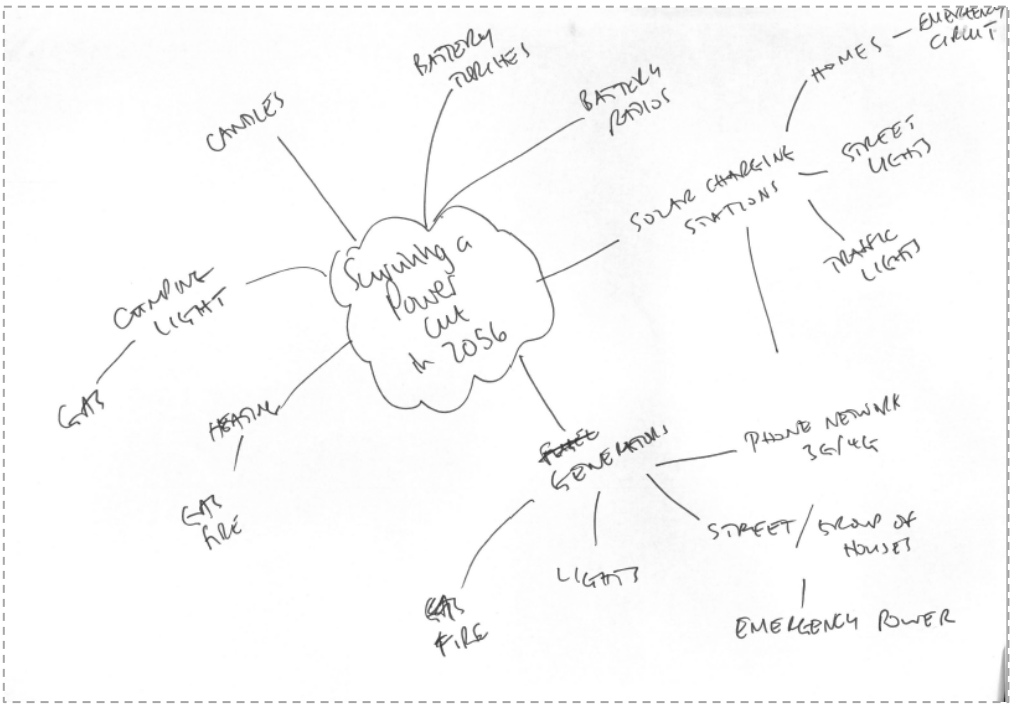


Figure 33: Powercut 2056

The workshop not only highlighted the importance of memory and past experience in shaping the public's view of infrastructure and future disruption, but additionally the spaces in which people consider blackouts to occur. For many, the only reason a blackout could occur was because of extreme weather and not industrial labour issues that were the reasons for blackouts in the 1970s. As the maps demonstrated, the ways that will help create a community recover quickly during a blackout are not always specific to this situation. Rather, they are demonstrative of skill; tools and equipment that will help someone cope. Placing the boundary of the future as one that begins as soon as a moment occurs, as the workshop did, automatically creates relevant scenarios and possibilities for multiple futures. The workshop was held to experiment with the ways in which we can rethink public engagement. Participants left the event with a sense of shared values and a new way of thinking about disruption. They were able to talk about their experiences and the effect disruption had on their futures with others, whilst learning ways in which their imagined futures may not be the same as others. Even if they were uncomfortable whilst being in the workshop, their participation changed the future occurring in practice during the event and hopefully they left feeling empowered that they already knew several tools to deal with complexity, they are not reliant on top-down structures to deal with disruption.

7.2.3 From Four Scenarios to The Future

Responsibility	Disruption: High	Disruption: Low
Authorities	Military involvement Provision of basic needs via emergency plans, rationing of vital goods.	Technological solutions and aid for general public as key aim to 'get back to normal' with least involvement possible.
Public	Individual resilience plans feed into wider community plan, making sure each member of the public is supported.	Continuation of community practices that focus on maintenance during times without disruption.

Figure 34: Scenarios Matrix

Using both the workshop and the two case studies together we can create a matrix of scenarios (Figure 34). Taking Responsibility and Disruption as the key critical uncertainties in a future where there are frequent electrical blackouts, the matrix demonstrates the role of both traditional 'top-down' authoritative structures such as central and local Government contrasted with a 'bottom' up responsibility of the communities who are affected. These are viewed in relation to a high level of disruption – long-lasting and affecting many, as well as low-level short, infrequent moments of breakdown.

The matrix presents these scenarios in relation to blackouts:

1. **Authority Responsible/High Disruption** An electrical blackout occurs across England. It lasts for over a week. Parliament enforces the military to act as protectors of the country's infrastructures during the time. Food, Water and Gas are rationed.

2. **Authority Responsible/ Low Disruption** A blackout occurs, however key infrastructures have not been compromised. There are digital aids that inform the public when the power will come back. Individuals do not have to do anything except wait.
3. **Public Responsible/High Disruption** A blackout is happening, it will last indefinitely. Resilience plans developed by communities come into play to deal with the disruption. Individuals contribute what they can.

4. **Public Responsible/Low Disruption** The power has gone out for an hour, the community must continue to uphold the maintenance of their communities that occurs during moments when the power is on.

Using this as scaffolding, we can create a layered and nuanced scenario that acknowledges that these differences of Public/Authority responsibility and High/Low disruption. Combining all four options is exciting, fresh and enables many to comment and interact with the scenario.

The scenario in the next section uses a historically progressive and continually present recollection and reuse of maintenance. First an image of the energy landscape in Lancaster 2056 can be built, using current policies and initiatives. Within this scenario, 90% of energy comes from renewable sources, this is an appropriate image as the current supposed trajectory is that this will be the route that energy supply takes in the next 40 years (Kemp, 2010) – a wholesale shift to renewables. For Porritt, crisis is a way of introducing the need for innovation. However, as one of the scenarios explored in this chapter will demonstrate, the need for maintenance and bricolage, bringing a diverse range of things together, is more important than constant innovation. Porritt does acknowledge this, ‘we already have everything we need, technologically, to get the job done – just about’ (2013: 275) however he does still argue for a ‘vibrant, dynamic, risky, innovation-driven transition’ based upon a series of step-changes (Porritt, 2013: 276).

Certain policies can be advocated in order to help bring about that future or alternatively to prevent a less desirable future from occurring. Several ways of imagining future scenarios in this way are:

- A shift in the way in which energy is used. Instead of increased connectivity as in the Smart-grid, the electricity system transition could lead to large-scale grid defection (Zinaman et al., 2015). 'Leaving the grid' and 'living off-grid' have recently become feasible options, mainly due to falling prices of solar cells and batteries and more renewables, this is likely to continue.

- A continuation of changing climate systems around the world. Through the Climate Change Act, the UK government has set a target to significantly reduce UK greenhouse gas emissions by 2050, including a ban on gas for cooking and heating by the same year. The increase in extreme weather is viewed as highly likely. Heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise' (IPCC 2014: 10; Stern, 2007).[140]

- Development of infrastructure towards increased battery storage capacity, meaning the grid is greater prepared for disruption.[141]

- Greater Devolution within UK government, granting more powers to local authorities. The Cities and Local Government Act 2016 set into motion a change in the way decisions are made locally, with the appointment of Mayors and combined authorities, aiming for more effective processes as choices and decisions that affect communities can be made close to them. (Interestingly, the guide to these changes

[140] http://www.ipcc.ch

[141] https://www.nationalgrid.com/uk/investment-and-innovation/innovation/system-operator-innovation/power-potential

from the Local Government Association contains the slogan 'Don't be left in the Dark').[142]

- The dominant role of technology in everyday lives, not only through artefact use but additionally the importance of data governance and the information held by large tech companies. Automation of common work practices sees an increase in the importance of 'our data self', the ways in which we adapt to technological changes are increasingly monitored and visible.

These policies, whether or not they extend to 2056 are a way of beginning the discussion that considers the practical steps taken to get to the scenario. They demonstrate shifts that are already written into policy, however, as this thesis has shown, an event does not happen suddenly, there is a history to decisions, designs and maintenance.

We now go into the future, into the blackout. Jonny, our narrator, helps us understand what is going on.

Ok thesis, *fast forward* 37 years.

142 https://www.local.gov.uk/sites/default/files/documents/dont-be-left-dark-devolut-886.pdf

7.3 The Blackout

(We are now in September 2056. We are still in Lancaster, it's still raining. As part of the University's knowledge exchange programme, that places the role of the 'non-academic' as the expert, I am interviewing Jonny. He used to be an engineering apprentice at Heysham 2 Power Station and today I wish to learn from him about what happens when a blackout occurs in Winter. I am a University Professor of Community Design, Knowledge and Futures. We chat at a special café dedicated to ideas about time and the future, first opened in 2025 to help people understand big issues in society from different perspectives as part of a government initiative I helped create)

In 2030, when the Heysham power stations were decommissioned, the City Council made the decision to purchase all renewable power systems around the city and go 'off grid'. After the fracking protests in the late 2010's, Lancaster became more experimental in its approach to energy and power – as the community owns all the systems, they are responsible for maintenance it when there are disruptions to the system. Although the land next to these stations was originally signalled as a possible site for a third nuclear power station could be built, the UK fell out of the Euratom agreement and so lost its ability to be a leading name in nuclear power.

In the years before Lancaster went off grid, the government had trialled mobile alerts for when blackouts were about to occur. These were modelled on the extreme weather alerts that phone providers sent for hurricanes or earthquakes, but as energy security became more of an issue, electrical blackouts became a disruption as significant as other climatic events. Detailing the nature of the blackout, informing residents to look to local media, this failed as the phone line for the maintainers was always busy with the emergency refuges became overcrowded with people who were not vulnerable, rather they had just failed to prepare themselves. The alerts demonstrated the way in which a system could work locally through individuals, rather than a national policy that ignored the needs of people.

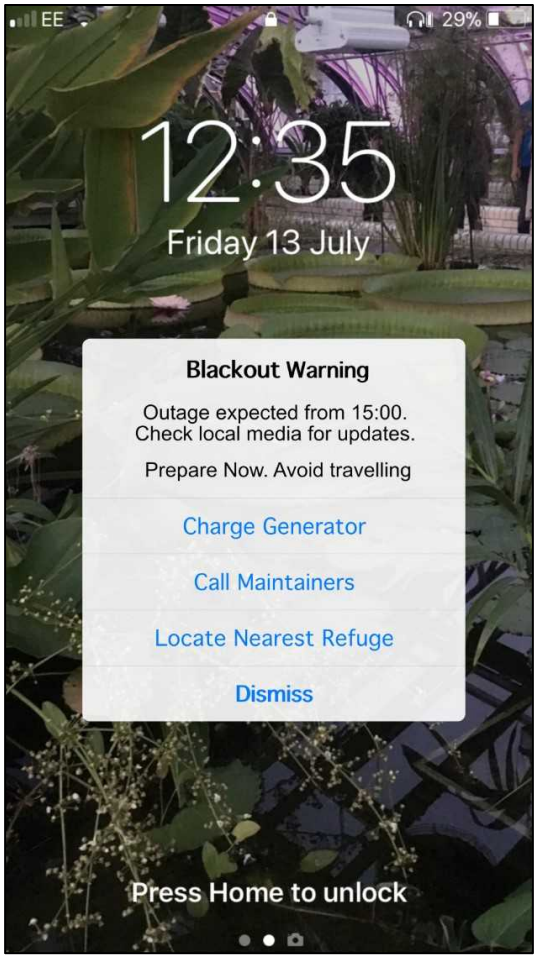


Figure 35: The Blackout Alert

The Government may have trialled methods of bringing the community together during disruption, but it felt too forced. The communities were not recognised as individual, with areas of similar sizes and demographics, considered to have the same needs and modes of resilience. Blackouts can happen at any time of year, for any length of time. Smart meters were once a device placed in all homes to monitor electricity use, presented as a money saving device. However, the connection to the internet meant that the policy enabled systems to be hacked. Instead, users are encouraged to monitor their electricity usage in alternate ways. Many homes having generators and use historical methods of energy production in the home, such as burning bio-friendly firewood and coal-less coal, a briquette like substance derived from food waste.

Jonny begins our chat by explaining the process of what happens when the blackout first occurs:

'When we have a blackout, the first thing we do is go outside onto the streets to see if anyone needs help – it is not an explicit task of mine as lead restorer, but as a member of the community we have learnt it is just as important to see if the people of Lancaster are in need, as well as the power.'

Figure 36: Drawing of the blackout by Maisie, aged 8

(He gets a drawing out of his bag).

'Here, my daughter has drawn an image of the power cut we had last week. We are lucky enough to still have some gas canisters left, so we still have the ability to cook when the power goes, however our neighbours have an electric oven and when the generators are low on charge because they have been used too often, the power takes a bit longer to come on, we are happy to do what we can for the community.'

Now that there is no continuous connection to the national grid, those who used to work on infrastructure projects run by companies such as British Gas and EDF run workshops to pass on the knowledge and skills to the younger generations. These include how to fix and maintain objects that do not require an external source of power.

(I raise this need for repair skills, asking Jonny what this looks like in practice).

'I used to be an engineer at Heysham, so when disruption occurs my skill set comes into use again. Although I never thought when I started that I would be using it to fix local energy supplies! I teach renewable maintenance at the college a day a week so that the skills are not lost. I remember the first time I showed them how to fix a wind-up radio. If anyone had shown me that when I was 16 I would have never thought it would be useful. We are all aware that we have some responsibility in the power going out, even if we weren't the sole cause, we might be called upon to fix it. Nowadays we all have a source of renewable power at home as well as the 'big 3' in town, but it can be temperamental, especially in winter. We're more secure than those on the grid still. Those boxes (what used to house the power stations) past Morecambe used to power us, but we fell out of favour with nuclear when the security threats began. The skills I have as a trained engineer mean that I become responsible for fixing things when external factors get the better of us!'

'The traffic and streetlights are all solar now, there are less cars than there were when my grandad was my age, but those that are around are electric – so they have to be charged as well. They have a back-up generator, so if I need to get down to the hydro or the wind farm, I know I'll still be ok in town.'

(I ask him about what he knows about previous disruption)

'We still have the emergency boxes packed, our grandma told us how they used to have power cuts and not know what to do and they had to check on the internet! We don't have that network when the power goes, it's often a security thing, so my family have to spend

time with each other and our friends and 'do some more creative stuff' Individual needs go on a register and are distributed accordingly. A thermal heated bean bag may not automatically be considered an object of resilience for many but for our son it's the first thing they use when the power cut happens. But for many, it's the water powered drone that is vital in this situation, delivering supplies to those in more rural areas or if there's a flood.'

(It is a well-known fact, both locally and nationally, that since going off grid Lancaster's electricity use has halved. Residents are aware of how important their own practices are on supply. In the winter, this means that a lot of homes use their own battery storage. However, these need to be constantly charged and on standby so often neighbours will either cook together to save power, or eat foods that do not require cooking. Since the banning of gas for heating in 2050, gas is sparse. I remember how there was a panic buy before the ban six years ago, which saw prices rise and queues at distributors. That wasn't fun)

These days, as Jonny reminds me, 'power comes back on within the day, so there is little need to begin the full emergency plan that is in place, however this is often adapted for the specific moment. We know power will come back on at some point, we just don't know when!'

(I know it is not always as friendly as Jonny's recollections would make us believe. Lancaster is not alone in its choice to individually manage its own power structures, both physically and socially. Ripon, Bangor, Salisbury and Worcester are amongst those that now self-govern and manage their own energy. We talk about how when blackouts occur in places that do not have the same methods of governance as these towns).

'People often travel to the towns where power is still on. When there is a national blackout, it's a security threat'.

(I ask him what he thinks about the additional security measures that can be put in place).

'Like when the government helps? They don't do that with most things anymore, but we have the army bases close by and they can help us out to protect the bridges and the ways into the city. Hasn't happened yet though'.
(I ask how he feels about this)

'Generators are common place and electricity is gone for no more than five days on average, but if it got to that point I would rather someone stopped others getting in so that my family could still be safe and have everything they need. Might not be the nicest thing to hear, having to hurt others who might need it, but we have worked hard to maintain the system we have.'

(We end our chat, and Jonny goes to a meeting about the technologies he is responsible for. I. head back to campus, wondering if when the power goes again, how long it will be for. I hope it's no longer than a week.)

7.4 Unpacking the Scenario

Disruptive moments reinvigorate the past and shape it further. They bring previous moments to the forefront of minds again, whereas previously they may have not have been thought of so readily. Past disruption opens a space for futures where things become hidden in a state of stasis, imbued with secrecy, mystery and power. However, emotions and sentiments carry through different events, relating and connecting those who experienced events previous to relay and distort information through an often-nostalgic lens. Those who promote these memories are the current gatekeepers who handover their assumed knowledge and influence. When future scenarios come to fruition, these are the gatekeepers of this knowledge, suspending a moment of disruption in time and applying a fixed point to it. This emotion feeds into a language of infrastructures, with shared rules and practices. A future scenario is contextualised by the events that have come before; the world building of scenarios already exists when the event has happened before. Building on these various operations through connotations, symbols and myths which represent a society is endowed with identity and distinguished both from other societies and undifferentiated chaos.

The scenario presents several aspects of the future: Wider infrastructure outside the home involves the introduction of renewable power to civil engineering. As well as an acknowledgement of alternative kinds of producing power, keeping the system going after a breakdown is based upon local, community needs rather than a national view: Through education maintenance becomes stronger and more prominent. These include how to fix and maintain objects that do not require an external source of power. Through education maintenance becomes stronger and more prominent. Within the design process of this community response are the individuals, who eschew the private electricity companies' view of the consumer to become producers in their own movements. Here possible involvement includes trying to get the system going again when it fails, as Jonny does, or simply checking on neighbours and making sure everyone on the street is accounted for during disruption. However, on these occasions the central government intervenes, as in exchange for devolution rights and less responsibility being placed on central powers, additional security can be called upon. This security is expected to be military, with the army bases local to Lancaster protecting the bridges and entries into the City. Although a sombre point to consider, the ways in which publics have become responsible for themselves means that every precaution has to be taken.

This scenario is provocative, certain aspects of this future are ones that would be welcomed (greater sense of community, less focus on new technological development), some are not (being shot for just trying to get power) and highlights a key aspect of futures literacy that needs to be upheld in the future, the role of the public as experts and the importance of conversations centred around action. Presenting the scenario as a conversation continues the key infrastructuring processes that were illuminated by both the case studies and the workshop.

In the blackout 2056 scenario, infrastructure retains its role as a social mnemonic - a reminder of the lack of maintenance in the recent past. Predictions made about what will happen are personally enveloped in a web that only exists in that current moment. The myth of the present is how the future is regarded, shaping policy and action. When things break down unexpectedly, they highlight the various aspects of power that were invisible during a more

peaceful time, within the visions presented here; there have been neither apocalyptic vision nor a utopian ideal. A pattern of interpretations demonstrates that in the case of infrastructures, to think of the future as complete breakdown and rebuild is inaccurate as there are aspects of our current regime that may not be recovered from the moments of disruption. As this thesis has shown, the remains of such breakdowns are used in a range of ways, the most important being the maintained upkeep of remembrance and perceived emotional resilience. The past weaves its way into the present; the national has an effect on the local – even as this scenario has shown, when it is distanced from central governance. Just as we must stray away from ideas of innovation throughout futures thinking, we must do the same with solely utopian or apocalyptic visions.

Society is not distorted to the extreme, during times of disruption, there are limits to what can and cannot be done in this space. By limiting visions of the future through this lens, by only taking the views of those who have experienced a shift in power during a breakdown a transparent process has been created for understanding future disruption. Although the boundaries of the scenario may have presented a small-scale local future that could be perceived to be lacking in imagination – boundaries within futures thinking are needed as they allow for a reassessment of current practices**.**

Scenarios outside of foresight tend to be constrained by certain anticipatory regimes (utopia/dystopia). Strategic foresight rejects the fact that the future can be good or bad and instead thinks of its latent potential. This scenario has utilised this notion, presenting a realistic vision that shows the response of a community and the emotions felt during a time in the future, the lack of dramatic change has been motivated by the previous case studies. Although the function of utopia in this context could be viewed as the desire for transformation to a point where there are no electrical blackouts, or a system of governance where the community work together to solve an issue. Those systems are in place in this vision, however a common criticism of utopian future visions is that they often fall short of explaining how would we get from existing conditions to the envisioned ones (Urry 2016), while predictive and prescriptive scenarios generated for strategic purposes often involve backcasting activities (Börjeson et al., 2006; Quist and Vergragt, 2006), future visions that are

created to open spaces of discussions are rarely followed by a systematic analysis of the pathways towards the vision. The purpose of this scenario is to highlight, an integration of the mundane aspects of the future which are a way of understanding that process of making the futures.

One aspect of the 2056 scenario that goes against many ideas of energy futures is the expectation that regardless of the energy source, blackouts will happen for years to come. This could be perceived as a dystopian vision, however as maintenance has shown – there is a way to cope. This goes against the view that in order for catastrophe to be avoided, there is the need for heavy state intervention discussions of dystopia often centre around an authoritative vision of governance. In this scenario, political power has been devolved from a centralised state, with a view of the community forming its own governing structures during disruption. While a regulatory state is needed to curtail wasteful production and consumption or polluting practices, when it comes to social change in relation to infrastructures the scenario has shown that individual practices can feed into a new structure that is not prescriptive.

As Molander (2009) notes, within the designed scenario space 'knowledge is only present in the form of knowledgeable people'. These are challenges of an imagined future; structures of time intersect and deviate at different points, whilst who holds knowledge can only be speculated. It is why maintenance has featured so heavily within the scenario, in order to present a future where although there are people perceived to be gatekeepers, they share and distribute their knowledge. The ambition of this analysis has been to view a scenario where there is both hope and caution, to present a future that considers systems and complexity in a novel way. Within all future scenarios there are aspects which can be perceived to be undesirable to certain individuals and stakeholders. However, as blackout 2056 has demonstrated, neither utopia nor dystopia need to be endpoints of a future. Instead, they are the beginning of a conversation.

7.5 Conclusion

The explorations in this thesis demonstrate that when an event happens that disrupts the status quo, those who have experienced it find a way of creating new infrastructures to cope with the present. These infrastructuring processes then feed into future practices and maintenance for when disruption reoccurs. There is value in allowing a local area to develop their own plans of the future which better links their infrastructure. Although there is no certain way of predicting the future, there is a need to approach future scenarios as a way of better understanding the present. This chapter has not served as a conclusion to the case studies, presenting what or why something should happen, instead, the main scenario presented has shaped an understanding of how we view events as catalysts for change, how we use power and the possible outcomes. The event is viewed as moment that creates a point where things need to be different from, however, this is connected to previous moments, it does not exist in isolation.

The scenario, formed through the previous case studies and workshop constitutes a clear vision that demonstrates the constraints of what we imagine to be possible. This is important as this chapter has presented a way of thinking about what is possible by combining policy moves with the everyday views of ordinary people. Although the scenario may not come into fruition in the way it has been narrated here, the vision pieces together practices of maintenance in place already and policies that look forward to 2056, acting in the present changes the real and imagined possibilities for the future. Combining scenarios into one vision allows for a layered complex issue to provoke and educate different groups in different ways.

8. Conclusions

8.1 Pathways to the Future

Back to 2019, the present day. The lights are on, my laptop is charging, my twitter feed is interrupted by promoted tweets informing me to call 105 for free if there is a power cut. 2056 is 37 years away. It is September, when the newspapers begin their annual warnings of extended blackouts over the coming months. However, this September, fear of disruption is being presented through the possible futures of a 'no-deal' Brexit. Twenty years ago, the country was gearing up for the invasion of the Millennium Bug. the lyrics of the Busted song 'Year 3000' were just something I sang whilst dancing around my room. Today 'not much has changed but they lived underwater' is fast becoming a bleak potential of the world we could live in. The future happens in the making, complexity shapes the present and the trajectory of one future becomes dominant, held onto by different publics in different ways.

There has been a shift from the idea that experts are supposed to 'know' the future to the importance of involving everyday people. Their ways of future-making are vital, in order to have 'better futures', the views and actions of publics need to be involved in the pathways to the future. Thinking about Social Futures requires using the models of publics during small moments of disruption, incorporating their actions whilst increasing their futures literacy. Power cuts have been used in this thesis as moments that highlight a pause in the perceived trajectory of time and not always a complete revolution of practices, but rather a period where maintenance becomes a method for creating better futures. Complexity becomes highly visible in these moments, intentionally and unintentionally.

This research started as a way of trying to understand and explore the relationships between power and big problems in a thesis, rather than discipline specific questions. Then, 'the future' of the thesis became visible, when I lived through a blackout on a significant scale. Considering power alone would not have presented any new findings; sociological and design enquiries

have studied the topic for years. Using the failure of networks as a way of understanding complexity, the case studies placed communities as central agents in bringing about futures. The key findings of this thesis are therefore methodological. In response to the question of how do we educate individuals about the future and what tools do they need to engage with pathways to the future. Several recommendations can be made, these are presented as steps towards Social Futures in Figure 37.

Figure 37: The pathway to the future

Prior to any direct engagement with the future, individuals, publics, organisations and governing bodies are already on the path to it. What is needed is an intervention on where those steps take them. The diagram highlights several key steps; the need to make complexity visible, maintenance of material, conversations between various organisations and individuals, sharing knowledge and an incorporation of these into action.

Making Complexity and Infrastructuring Visible: This thesis began by introducing complexity and the notion of publics (Di Salvo, 2009) in the introduction to consider processes of infrastructuring. Identifying how connections to past and present are embedded in the system and how more engagement, public education and co-creation is needed within the study of the future. It detailed why electrical blackouts are a key event to help us understand disruption and what happens during moments of perceived breakdown. This approach taken in this thesis demonstrates the difficulties of how people interpret a system. Mechanisms that can bring about change and understanding complexity have been emphasised. Wicked problems (Rittel and Webber, 1973), so often referred to in design and policy literature were presented in chapter 2 as not being the best way to understand complexity (Thackara, 2010). Instead, an inventive approach, as demonstrated through the other steps to the future, should be taken.

Maintenance of Material: There is a need for publics to incorporate the threat of disruption into their daily lives and to reassess what actually needs to be maintained within networks. This research was not trying to resolve the issue of disruption; my approach accepted that there will still be disruption in the future. However, it has highlighted that finding new ways to understand how we cope and approach issues can often be more beneficial than trying to fix them. With change there is not always a deliberate 'before' and 'after', rather the future and what comes next is an adaptation enveloped in the past and present. Publics need to be equipped with the right tools for understanding. These can be developed by working with current futures practices intended for business and government, such as strategic foresight (Ramirez and Wilkinson, 2008) to highlight how the preservation of past artefacts and emotions are important.

This need to highlight maintenance over innovation (Thrift and Graham, 2008) was explored emotionally through the presence of a 'blackout spirit' connecting past events to the present. Maintenance is not only a tool of physical infrastructure and systems, but additionally it is a tool that forms publics. Innovation only benefits the few, whereas maintenance is something that is seen every day in the lives of ordinary people and after disruption became a tool to create preferable futures, whilst combining past and present to the future. Through publics becoming aware of the 'systemness' of energy at community and local levels, private energy companies communicated the importance of workers in the system. At the same time publics were able to create maintenance plans that highlighted potential actions that would be taken when further disruption occurred. Throwing light on visibility of system saw the ways in which publics processed immediate futures after an event and how institutional response changed from one that was heavily involved in shaping response to one that provided help only when disruption occurred.

Communication through conversation: Establishing communication is vital to aiding futures literacy. A citizen set agenda creates a space for a myriad of concerns and views. Citizens can articulate their needs and desires. Open spaces are needed so that publics own issues can come to fore. These spaces may both create and be created in unusual atmospheres. The workshop in Chapter 7 is an example of this space, but futures literacy laboratories (Miller 2018) can happen anywhere and do not need to be in moments of disruption.

Share Futures methodologies were highlighted in chapters 1, 2, 6 and 7. A sharing of these practices needs to occur in order to create visions of the future that are balanced. By presenting one scenario that speaks to multiple issues, this thesis highlighted how complexity can be addressed with one scenario. Scenarios are embedded within a timeline of past, present and future. Learning occurs when they are considered together, placing the workshop alongside other methods in the thesis, notions of emergence and path dependency became clear. The scenarios require 'scaffolding' from other moments, not those purely based in the future. This sharing of practices across timescales can then aid future action.

Act - Finally, action is central to creating Social Futures. Both the case studies of chapters 4 and 5 demonstrated the moments of push and pull in infrastructuring practices that shift the ways in which the future is perceived, used and created. Action needs to be central to every approach to the future. Without it, complexity will remain an issue that is not embrace but instead loathed, misunderstood and used as a tool to control. Publics develop new ways of dealing with complexity during moments of disruption. As Chapter 6 highlighted, these moments of action are carried through to future points in different ways by different bodies. Practices may resist or fuel resistance, yet this is vital and needed within a study of Social Futures.

8.2 Empirical Outcomes

I could have focused on one blackout; I could have developed a narrative that would highlight a primary issue faced by the communities at one moment in time and asked detailed questions. However, as this thesis has shown, even singular time periods are complicated and impacted on by what has gone before, and what is yet to come. Narrowing focus would have been an injustice to the nature of research, the complexity and the publics affected by disruption. I chose to keep the focus broad, the design and thinking matched the breadth of what was explored. Just as every power cut is different, every group of publics always will be. Working at scale, both national and local, allowed for an understanding of what happened in those spaces; demonstrating how publics are formed. In turn, this led to a way of understanding how better to work with publics.

Case studies were identified as a key tool in understanding electrical blackouts (Chapter Three) and contributing to a study of change and moments of disruption. A mixed methods approach including; semi-structured interviewing, fieldwork, social media analysis, archival research and creative design methods shaped the cases. The use of case studies as a method demonstrated that often information on disruption is difficult to find once the event has occurred. This led to a discussion of visibility, both in the archive and in the field, which highlighted the processes that were undertaken, carried on, adapted, and evolved to provide a narrative to a pause in the official designs of systems. The participants involved in the study

became those who may not have originally been part of the official narratives prior to disruption. Involving them in the case studies meant that a new way of looking at power, one that deals with the minutiae of everyday life provided a way of considering how social change really happens.

Physical infrastructure is always going to have an element of history embedded in the design, but additionally so is the social infrastructure, as memories of past events will always be embedded within the everyday. However, they may only become visible again when the present is paused. Chapter Four detailed the practices that took place in 1974, when actions set into motion institutional patterns and chains of events that had deterministic properties for disruption to infrastructure in the future. These actions changed everyday life, not only with the instruction to consumers of how to deal with a power cut, but additionally the importance placed on the individual in preventing future disruption. The case of the blackouts in 1974 shifted the current historical emphasis of the political rather than the material to a consideration of the event as a site which began motions of change. Involving this historical analysis in a study that deals with complexity enabled for the 'layered quality' of infrastructures to be seen, as Chapter Four provided a different narrative to that explored in previous academic discourse. Publics were presented as needing to be educated constantly by the Government about not only how they were to use energy during the crisis, but additionally after the event itself. With the introduction of energy saving policies in the home, change was viewed as not only something which was the responsibility of those high up in power, but the home was the space where change began.

Chapter Five presented a different type of electrical blackout, the Lancaster blackout of 2015. Privatisation meant that responsibility of the electricity network was shifted to corporations, yet the governance of such systems was not placed with these bodies. This messy mix of responsibility meant that the response to the disruption during the event highlighted how to better work with publics. This case study highlighted how attention to situated detail in one small-scale scenario can help us unpack a world of complex and sometimes global issues. Pathways in policy have often been developed to meet specific needs; methods for understanding systems are something that is often left out of policy, where decision makers

want to focus on other factors such as those that are purely economic or political before considering the needs of individuals and how to address them.

The Lancaster blackout led the community to understand the system through its disruption, through technologies that were considered to be old fashioned, such as the radio, brought people together, creating new publics who could cope with the absence of more recent daily practices, including the use of mobile communications. These publics shared responsibility with those in charge of the network, later taking it into their own hands with the emergency plans explored in Chapter Six. Lancaster highlighted the end of big-state solutions to disruption. Change now occurred through the publics affected, rather than being a top down assessment of what needs to happen.

The cases of 1974 and 2015 were considered as the archive of the scenario in chapter 7, how change occurred in these spaces demonstrated that futures were already happening in the present. The inclusion of the past in the response of those experiencing an event affects the response to futures concerning similar disruption, this was central to how publics anticipate futures. Additionally, mapping was used as a participatory method to further understand how those who are part of the infrastructures understood the complex factors that shape both the future and the networks that they are part of, both social and physical. Incorporating different levels of narrative, persons at all levels connected with the problem and became involved in shaping the output. For example, those who work within the electricity sector as well as the publics who have systems of governance and policy imposed upon them. The scenario presented in Chapter 7 demonstrated how local, national and institutional responses could be interwoven to create a future where disruption was commonplace but change through maintenance was always possible.

Throughout the thesis the importance of the visual in studying something that is not always visible or a simple linear path has proved vital. Mapping systems allows big complex issues to be tackled in a holistic, post-disciplinary way. This mode of systems thinking in this project had implications for not only the area of research (in this case the theme of power), but additionally implications for participants - citizen engagement is vital to transition. Through

forming community groups and 'emergency' services to deal with disruption, publics have developed new systems that require maintenance over new 'innovatory' models.

8.3 What next?

Thinking about the future is essential for the present, doing futures research requires presents that engage with the complexities of time, the old and new social spaces and objects. This understanding of the world might lead to change and new eventualities, researching in the hope of change rather than explicit intention of change can be more beneficial than asserting grand narratives of change into infrastructures. Conducting the research in public, with multiple stakeholders and engaging with these different levels and scales is vital.

This research has an impact on not only the publics affected by disruption but additionally for governance, business and global futures: For the individual, this thesis has placed them as key to not only forming futures, but they are central to the action that shifts and deals with complexity. The workshop of Chapter Seven can be used as a way of addressing how the future can be brought into the everyday. Within government, authority and commercial future making, the ways in which literacy is approached by publics is useful for providing less resistance to policy. If issues can be highlighted early through a sharing of practice, policy decisions based on creating targets and shaping different futures may met with less friction, creating less disruption. The lens of this research has focused in on a small-scale approach to futuring, the modes of infrastructuring employed throughout the cases demonstrate how different publics act upon issues. In order to approach futures from a global perspective, these smaller expressions of the future are vital. Combining multiple examples from multiple landscapes can add to unpacking complexity.

Within the confines of a doctoral thesis there is a limit on what can be achieved. A PhD is limited in scope, context and issues due to its size and the need to be examined in one discipline. Given the opportunity, I would have liked to have tested the findings of this research in different settings, with more diverse groups of participants to assess not only adaptability but additionally how different publics are formed and adapt to change. This opens up several potential avenues for further research. Publics are formed in response to

various events, not solely disruption. The post-disciplinary space means that collaboration with others allows for adaptability for the needs and use of the research. From a design perspective, more conversations and workshops are required for testing the ways in which collaboration with publics can occur. For example, having more participants create future scenarios through practices, experiments and testing. This would then have led to participants co-producing, engaging in, and acting out futures.

Social Futures may be complex and messy, but so is the present. We need to pause moments that look towards grand visions of what is yet to come and reflect on what is in front of us right now. Change is often not a grand upheaval, but a shift in understanding and requires small steps towards maintaining and repairing what already exists. Power will always shape the ways in which people act, and through understanding how to create better futures, publics can become better prepared, have greater literate and live through better presents.

Afterword: After the viva

The future I envisioned for myself at the beginning of my doctoral journey was not the future I wanted 48 hours before my initial hand in. Having a viva that lasted three and a half hours was not planned either. However, complex PhDs take time to work out. Six months on, my own future's literacy has increased. I also had time to make my diagrams look a lot nicer. Why is this important? In the 6 months since my viva, I have had some ideas. I have worked with the issues, tried to loosen the knots, began to think about next steps.

The main idea I have had for future research is the importance of communication. Creating open spaces where publics can talk about what comes next is needed and wanted – every week there seems to be a new issue in the news, politics or cultural life that needs explanation. One future I would like to see is the 'futures café' of the scenario in this thesis come to life. Imagine being able to go to a space to imagine the futures of Brexit for yourself, free from the media narratives of marked dichotomies. Being able to work out for yourself what you care about, rather than just doing what someone else tells you will happen. There's still work to be done and knots to be untied. This is just the beginning of the future.

You cannot force people to change how they act, but you can help them give them the right tools so they are empowered. Finally, as you are reading this in the future, is the power on?

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Appendix 1: Question Guide/Script for Focus Group

Thanks to all participants for being here. Outline aims of the focus group and estimated duration. Detail recording as outlined in information sheet and consent form. Any questions before we make a start?

1. To get things started, if everyone could introduce themselves and outline why they are interested in talking about the Storm Desmond blackouts, that'd be great! Ill kick things off…
2. So (drawing on some of the aspects mentioned by participants in what they hope to get out of the session) How did the blackout happen to you? What things stood out as being important? Why are they important?
3. What did you do differently during the blackout? Was anything made easier or more difficult for you during the blackout?
4. (Frame based on responses to previous discussion) And how important was that for you? Is this something that you think is significant?
5. To what extent do you understand the infrastructure that is in place in Lancaster? What do you think infrastructure is?
6. Has anything changed for you since then as a result of your experience? Does anyone here think that the way in which they interact with power has changed in the last year as a result of your experience of the blackouts? In what way?
7. Do you think differently about what might happen in the future because of the blackouts?

Appendix 2: Project Information Sheet

The 2015 Lancaster Blackout: Experiences and reflections.

My name is Georgia Newmarch and I am a researcher in the Department of Sociology at Lancaster University. I am conducting a research project into how people live during blackouts and how blackouts change people's ways of living. I would like to invite you to participate in the project.

If you decided to participate, you will be asked to meet with me for a focus group of around 10 people, who also were present during the blackouts in December 2015. I will ask questions about your experiences around the event. Further details are found below.

The focus group will take place at [**insert time and place**], and will last an hour. It will be audio recorded so that I can reflect on what we discuss. Participation is entirely confidential. The information will be encrypted; password protected, and kept in a secure location at Lancaster University. The results of the project will form the basis of my doctoral research and may also be published and presented at academic conferences, but your identity will not be revealed.

Further Information

What is the purpose of this study?

This project will investigate how people lived during blackouts in the context of the December 2015 electrical blackout in Lancaster in December 2015.It will try to understand if people are thinking differently after the event. The focus group is a chance to hear how others have experienced and moved on from the blackouts, which participants might find beneficial to hear other members of the community talk about their experiences.

What will happen if I take part?

Taking part in the research is entirely voluntary. If you decide to participate, you will take part in a focus group with c.5 others. I will ask you about your practices during the blackout, your view of the event after it has happened and any changes around your life that you have experienced because of it. You do not have to answer any questions that you do not wish to, and you may withdraw from the study before the focus group begins.

Contributions to the workshop discussions after the discussions in the workshop have started cannot be withdrawn as it would be difficult to 'extract' an individual's contribution to the discussion in the workshop after the discussion has begun. Discussions in the workshop should not be discussed with others outside of the workshop.

Will what I say in this study be kept confidential?

All information collected about you will be kept strictly confidential. I will present the findings of this project in my doctoral thesis, which may then form the basis of academic articles, conference presentations and reports. All participants will be anonymised and any details that might identify an individual will be altered in any presentation or publication. However, anonymity cannot be guaranteed due to a small group of participants taking part or the nature of employment undertaken by participants

If you are affected by any of the topics discussed in the focus group you might find these contacts a useful resource:

Lancaster Citizens Advice North Lancashire
87 King Street
Lancaster
Lancashire
LA1 1RH
www.northlancashirecab.org.uk/

National Flood Forum

http://www.nationalfloodforum.org.uk/

01299 403055

Who is organising the research?

I am conducting the research as a doctoral researcher in the Department of Sociology at Lancaster University. It is funded by the Engineering and Physical Sciences Research Council (EPSRC). It does not have any commercial interests, instead it is part of a tradition of sociological research that aims to understand how society works and how it is changing.

Who has reviewed the study?

This study has been reviewed and approved by the FASS-LUMS Research Ethics Committee at Lancaster University. The project abides by the British Sociological Association's Code of Ethical Practise.

If you would like more information about the project, please contact me by email or by phone:

Email: g.newmarch@lancaster.ac.uk

Georgia Newmarch
Department of Sociology
Lancaster University.

If you have any questions or concerns about the way this study is being conducted that you do not wish to discuss with me, you may contact one of the project supervisors:

Appendix 3: Participant Consent Form

The 2015 Lancaster Blackout: Experiences and reflections.

Researcher details:

Georgia Newmarch, Doctoral researcher, B107 Bowland North, Department of Sociology,

Project supervisor details:

[Information redacted in thesis]

I, the undersigned, confirm that (please tick box as appropriate):

1	I have read and understood the provided information sheet about the purpose of the project.	
2	I have been given the opportunity to ask questions about the project and me participation in it.	
3	I voluntarily agree to participate in the project.	
4	I understand I can withdraw at any time before the focus group without giving reasons and that I will not be penalised for withdrawing nor will I be questioned on why I have withdrawn.	
5	The procedures regarding confidentiality have been clearly explained (e.g. use of names, pseudonyms, anonymisation of data, etc.) to me.	
6	I consent to my involvement in a focus group and for it to be audio recorded, I understand that discussions in the workshop should not be discussed with others outside of the workshop. Discussions in the workshop should not be discussed with others outside of the workshop.	
7	The use of the data in research, publications, sharing and archiving has been explained to me.	
8	I understand I cannot withdraw my contribution to the workshop discussions after the discussions in the workshop have started	

Participant:

_____ _____ _____

Name of Participant Signature Date

Researcher:

_____ _____ _____

Name of Researcher Signature Date

This consent form will be kept by the researcher for at least three years beyond the end of the study.

Appendix 4: Author Experience of Lancaster Blackout

My phone is always next to my bed, but it was not the alarm on my phone which woke me up. Rather it was the daylight coming through the blinds. Just before 8am, two hours later than I usually wake up. I know that is early but I like working early in the morning when there are no emails to answer to, nothing to interrupt reading or writing. I had a better sleep than I normally do, usually the light on the balcony outside my bedroom window combined with the thoroughfare of residents coming to and from the lift during the night wakes me up. Perhaps going to bed at 10pm helped as well, as usually I would stay up until about half past 11. My first thought upon waking was to check if the electricity was back. I got out of bed, freezing (I had slept in an extra jumper that night) and flicked the main light switch. Nothing happened.

I checked our water, still not on. The electricity board had informed us that the power might come back and then off again, so I had hoped during the night it had come back and we might have some hot water. But, I live in a modern development that was converted in 2013; as a result, it is all electric. A terrible electric cooker, electric locks, 2 lifts, electricity pumps water around the building. The building is seven stories high and me and my housemate Helen live on the sixth floor, so if something stops working on the ground floor (where all the switches are) it has an automatic effect on us. We have to walk up the internal stairway when the lift breaks; we have no water when there's something wrong with the plumbing. Which is ironic, because when I moved in it was advertised as being modern and an easy way of living, our bills are managed by the landlord, the water heater timer set by the building's management. All I do is pay rent and live in the flat.

After accepting that there was no electricity or water, I washed myself with the bottled water we had bought before the water had gone off a few days before, when the building had flooded and a resident had pointed out that some of the floodwater was sewage. I put on some clothes, leggings, a few cotton tops and a sweatshirt that said 'Lancaster University' on it. This is not the usual attire I wear for leaving the house, but I needed to be comfortable. I

didn't know how far I would have to walk today, or where I would end up. Or what I would eat or how I would even get that food.

I have allergies so I have to be careful with what I eat, meaning whereas most people could take advantage of the bread Sainsbury's was handing out I had to try find somewhere with food that I could eat, I had thrown out all the food in our fridge after the first day. We don't have a freezer so luckily didn't have to throw much food out, although I had done my shopping for the week the day the substation flooded. I put my wellies on and my beaten-up Land's End jacket that's only good for dog walking now. Over the few days it became my uniform, the same sweatshirt and leggings and jacket. I just needed to get on with trying to find food and water. I didn't wear makeup, how could I when it would have used more water just getting it off? People think I am high-maintenance; I'm not, I just feel more like myself when I try.

I didn't need to feel like myself during that time though, as the normal structures where my image made me feel a bit more confident were not in place. I couldn't go to shops; my behaviours had changed.

I got my breakfast from a van that was handing out chips, at 8.30 am. Got my housemate a burger and chips and took it back for her, she was beside herself at this point. Coming from Nigeria where generators are commonplace in the home she had taken a while to adjust to our constant supply of electricity and then when it was taken away with nothing to replace it with apart from a few candles. The candles at night made everything seem hopeless.

I don't know what I was expecting to accomplish when I was wandering about town. Well I do, I wanted food. Generators were in place in most places now, but not our building because we were badly flooded. I wanted a hot meal. I needed a hot meal. No-one in town was serving food because it required too much power. The vegetarian café was open and serving 'things on toast' eggs, tomatoes and spinach. They were very nice, but everyone was being so, and made me eggs on toast with gluten free bread. I remember eating it so quickly but feeling like I had never had eggs on toast before. After eating it I felt like I didn't know when I was going

to eat again. I had tea as well! But now cow's milk so had to have soya. None of the shops that were open selling food, Tesco express, marks and spencer's, had cow's milk.

The traffic lights were not working, one-way system. But it felt like there were not as many cars on the road, the petrol stations couldn't open and by the third day those who could get out had. Lancaster had become an island, on the Monday I had watched the army escort ambulances over the bridge that had been hit by a shipping container. It felt like we were in a war zone. The one-way system didn't exist anymore because there was no one going any way.

I met someone when I was on my wanderings; he was a teacher at a local primary school. He told me how he had cycled to the school to check to see if parents were bringing children to school. I had a nice walk with him to farm foods, which was open – it's where I bought water from. But he was a lovely man and told me that I could get water from his house, I declined though. I don't know why, I guess I just don't like asking for help. I am very independent and if someone asks me if I need help I always try make do with what I have.

It wasn't a normal situation either, and I trusted the man but I was so tired and drained. Lancaster is a place where strangers often talk to each other on the street but the flow of conversation felt a lot more natural, boundaries had been broken down as we all shared the common experience and even if I didn't talk to every person I came across whilst walking around, I felt comforted by the fact I was in a community experiencing this.

Appendix 5: Objects needed in 2056 and their role within the scenario according to participants

Object	Infrastructures	Infrastructuring	Home	Self
Candles				
Torches				
Food and Drink				
Portable Chargers				
Lights				
Heating				
Camping Gear				
Wind Up Appliances				
Matches				
Tinned Food				
Battery Powered Radios				
Thermal Heated Bean Bag				
Non-cordless phones				
Emergency Box				
Water Butts				
Blankets				
Jumpers				
Fire				
Wood				
Water Tower				
Generators				
Emergency lighting				
Water-powered drone				
Substation Moved				
Renewable power				

Solar Power				
Wind Turbines				
Buy a boat send everyone to another city				
Tesla Batteries				
Support Groups				
Volunteers				
Care Packages				
Gas				