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Title: Unthinking knowledge production: from post-Covid to post-carbon futures

Abstract

The past years have witnessed a growing awareness of the role of institutions of knowledge production in reproducing the global climate crisis, from research funded by fossil fuel companies to the role of mainstream economics in fuelling the idea of growth. This essay argues that rethinking knowledge production for post-carbon futures requires engaging with the co-determination of modes of knowing and modes of governing. The ways in which knowledge production is embedded in networks of global capitalism shapes how we (can) think about the future. The essay argues for an attentivity to the material and infrastructural sides of knowledge production, which will enable us to re-think transition to post-carbon futures in ways that recognize the deep structural, spatial and social inequalities underpinning knowledge production.

Key words

Knowledge production, capitalism, climate futures, infrastructure, political order

Introduction

The Covid-19 pandemic has posed an unprecedented challenge to institutions of knowledge production. As campuses shut down, universities sent – sometimes almost forcibly – students back to their ‘homes’, and research facilities limited their activities to essential maintenance, shock and confusion were replaced by a sense of foreboding: what kind of future awaits higher education and research in a world in which these disruptions – caused not only by pandemics but also by the worsening climate crisis – are becoming more common?

For many scholars, the Covid-induced shutdown also presented an opportunity to think about alternatives to capitalist modes of production (e.g. Alves & Kvangraven, 2020; Spash, 2020; Mair, 2020). Over the past years, a consensus has emerged about the links between the current configurations of global capitalism and the climate crisis. The tendency of capitalist modes of production to extract, use, and dispose of natural resources in ways that systematically harm both the people and the environment has reached a point of emergency (e.g. Gills & Morgan, 2020). The role of economics, and in particular the specific kind of economics defined by mathematical modelling, has often been identified as one of the main ‘epistemic handmaidens’ to extractive capitalism (e.g. Lawson, 2016; Çalışkan & Callon, 2009; Callon, 2007). This means thinking about post-carbon futures needs to account for the role of disciplinary knowledge(s) in creating the conditions for the current crisis – and, presumably, their role in overcoming it.

The argument of this essay is that this project is complicated by two factors. One is the history of Western knowledge production, and the way in which institutions such as universities carry the legacies not only of colonialism and slavery – something that they have reluctantly begun to address – but also of extractive logic of global capitalism. The other is the degree to which our own thinking – including thinking about alternatives to capitalist modes of knowledge production – itself continues to rely on an extractivist logic that remains conveniently blind to infrastructural and material affordances. As a consequence, any attempt to think about the future that is *not* capitalist or extractive-colonial faces the seemingly impossible task of undoing its own conditions of possibility (Mignolo, 2011; Arendt, 1961). This requires us to connect our own projects of critique and reform to material and infrastructural affordances of contemporary capitalism, and their role in climate crisis.

The essay begins to trace these relations by highlighting the co-determination of modes of knowing and modes of governing – including capitalism – and their role in climate futures.

This foregrounds the question of the relationship between knowledge and political order (cf. Shapin & Schaffer, 2011 [1985]). While critical and heterodox economists have recently started paying more attention to the role of (mainstream) economics discipline and economics teaching in reproducing conditions of capitalist exploitation (e.g. Mearman, Guizzo & Berger, 2018; Spash ed., 2017; Çalışkan & Callon, 2009; Callon, 2007), the organization of knowledge production *in relation to* broader socio-political context has remained somewhat underexplored. This essay contributes to the focus of this special issue – the role of economics in post-Covid, post-carbon futures – by offering a conceptualization of knowledge production that emphasizes its relationship to the legacies of capitalist extraction, in order to highlight how we might begin to overcome them in the future.

Fear of the future

Future-oriented research, having all but disappeared from the agenda after the dissolution of the Soviet Union and the pronouncement of the end of history, has received a renewed impetus in the past ten years (Andersson, 2018; Amsler & Facer, 2017). While we should not underestimate the relevance of changing funding conditions on shaping institutional isomorphism or ‘branding’, at least a part of this impetus comes from the perception of the risk that processes such as climate change and the development of autonomous technologies pose to the future of humankind¹. As other scholars have argued, the implicit universalism of ‘humanity’ can exclude different populations and political subjects that have been historically marked as ‘Other’ – indigenous peoples, ethnic minorities, refugees and migrants, and the poor (Yusoff, 2018; Clark, 2011). Less well documented, however, is how thinking about the future impacts of climate change can simultaneously exclude the consideration of the impact of climate change on one’s own practices, including knowledge production itself.

There is an extensive literature on knowledge production that is critical of capitalism, and, in particular, of neoliberalism as its most recent manifestation (e.g. Giroux, 2013; Newfield, 2003; Bok, 2003). While this kind of writing has tended to foreground the questions of justice and/or the exploitation of academic labour, it rarely engages directly with *climate* justice or the value or the exploitation of *non-humans*. In this sense, academic critique of neoliberalism tends to exhibit a particular kind of anthropic bias, in the sense of inability to imagine a world that doesn’t involve the standpoint of an (at least implicitly human) observer (Bostrom, 2010). Of course, ‘non-humans’ have been a trendy topic in social theory for a number of years, in part

because of a growing realization of the relevance of non-human ‘Others’ to human survival on the planet (e.g. Blok & Jensen, 2019; Latour, 2017; Danowski & Viveiros de Castro, 2017; Haraway, 2016; Tsing, 2015). Yet, with very few exceptions (e.g. Wark, 2015; Yusoff, 2018), these treatises have seen the production of theory as distinct from the question of knowledge production and its role in climate change.

This isn’t to engage in performative moralization of academic behaviour akin to ‘shaming’ climate researchers for taking long-haul flights. It is, rather, to draw attention to the fact that all forms of knowledge always include ignorance (e.g. McGoey, 2019, 2012). Ignorance occurs not only as ‘lack’ or ‘absence’, but also as blind spots systematically produced by focusing on specific research objects (Bacevic, 2020). This assumption – that better critique leads to better practice – is the contemporary version of scholastic fallacy, something I have dubbed ‘gnossification’ (Bacevic, 2019). Of course, there is nothing particularly original in noting that knowledge production relies on other forms of reproduction (cf. Bourdieu, 1997; Woolf, 1929). Challenging – and changing – academic practices is necessary. Yet, while ‘green’ values, curricula, syllabi, and practices are relevant, they are not sufficient for a transition to a low-carbon economy. Students may adopt sustainable values, beliefs and practices, but these would not help if the only jobs available in 20 years are provided by fossil fuel companies (Su & Su, 2019; van Dijk, 2019). We may reform the curriculum (and other academic practices) so as to reflect a commitment to decarbonization, but this does not mean that academic knowledge production becomes detached from the commitment to profit that ensures carbon emissions continue to rise.

In the context of this essay, I draw attention to the fact that systematic ‘forgetting’ of the infrastructural and material affordances of knowledge production means that most initiatives for low-carbon, ‘sustainable’ academic knowledge production do not disrupt the broader capitalist logic of extraction². In other words, they produce increasingly nuanced analyses, but not necessarily better ways of changing the status quo. Disentangling these habits requires not only acknowledging how the infrastructures of knowledge production are rooted in capitalist pasts, but also how they shape the way in which we think about the future.

Capitalist pasts

The emergence of global networks of knowledge production is deeply intertwined with the history of global capitalism (see e.g. Kamola, 2019; Santos, 2014; Connell, 2007). Collaboration and exchange between scholars, of course, pre-dated both the emergence of capitalism and the emergence of nation-states (Pietsch, 2016, 2013; Perraton, 2014). Yet, the organized production and exchange of knowledge cannot be separated from systems of global trade and colonial extraction (Stein & Andreotti, 2016; Moore, 2015; Bhabra, 2014). While institutions of knowledge production have belatedly started acknowledging the role of colonialism and slavery (Wilder, 2013), they are still far away from recognizing the degree to which they not only contribute to, but benefit from, modes of production that both created and sustain the global climate crisis.

This may sound counterintuitive, as many institutions of knowledge production in the past years have been quite vocal about taking steps to combat climate change (Rickards & Pietsch, 2020). In some cases, this has included decisions to divest, which usually means withdraw their funding and/or assets (proprietary technologies, research facilities, staff) from activities that directly contribute to the climate crisis (for instance, fossil fuel extraction). Some institutions have refused to perform research for or accept funding from companies that pollute the environment or engage in environmentally harmful practices. Many more have adopted various packages of so-called ‘green’ policies: from incentivizing commuting by bike or public transport, installing systems that conserve energy, to recycling on campus, and, in some cases, mandating the use of biodegradable or carbon-neutral materials and technologies in catering, cleaning, and other maintenance services.

As commendable as these initiatives are, a deeper look at the political economy of knowledge production suggests they are minor in comparison with the broader ‘footprint’ of relations and practices that underpin them. The expansion of higher education in the second half of the 20th century was primarily driven by the perceived link between knowledge and economic growth (Wilder, 2013; Newfield, 2003; World Bank, 2000). Scientific research was similarly stimulated by the assumption that knowledge provides economic and political advantage, both in ‘peacetime’ – through innovative technologies designed to boost production – and in situations of possible conflict (e.g. Chomsky et al, 1997). After the Cold War, the technoscientific race became transposed on to the global knowledge market, with countries – and, increasingly, supranational entities – competing for ideas, innovations, and technologies that could be sold at the highest price. This shift from the idea that knowledge afforded

advantage in trading, to the idea that knowledge itself can be traded, gave rise to the concept of ‘knowledge economies’.

The concept of knowledge economies effectively involved outsourcing production (especially ‘dirty’, polluting forms of industry) to China and other Asian countries, while retaining the development of ‘software’ – innovation and technologies – in countries of the Global North, primarily US and Western Europe. This amplified regional inequalities: despite improving the living conditions of *some* people everywhere, it increased the gap between the wealthy and the poor (see Hickel, 2017 for a comprehensive treatment of the idea that the world is becoming more equal). Equally importantly, it amplified global CO2 emissions (Jiang et al, 2019), both through the intensification of global trade, with emissions related to both production and transport across increasing distances, and through increased mobility of people. Both were connected to global business and, increasingly, to education and research, as countries struggled to attract the ‘brains’ – that is, people – who could drive innovation (Wildavsky, 2010; Zemach-Bersin, 2009).

What is usually called the neoliberalisation of higher education, therefore, needs to be seen as only the most recent phase in the co-evolution of knowledge and global socio-political order (see e.g. Hartmann, 2019). The growth of higher education was primarily driven by private investment, either through inter-generational transfer (i.e., parents financing their children’s education) or through graduate debt (McGettigan, 2013; Bok, 2003). For global centres of knowledge production – primarily Europe and North America, closely followed by Australia and New Zealand – a great deal of investment came from tuition fees charged to international (non-domiciled) students. In most cases, this effectively means cross-border transfer of private funds, where students rely on personal or family income, or take out private loans in countries of origin. While some EU member states allow for (intra-union) portability of grants and loans, and generations of students have benefited from grants provided by governments (e.g. European Commission’s Erasmus scheme) or private foundations (e.g. Gates), these forms of investment are usually seen as contributions to the development of ‘human capital’ and/or instruments of ‘soft diplomacy’ (Perraton, 2014).

Global flows of capital and global networks of knowledge production, in this sense, reflect and reproduce colonial relationships between ‘centres’ and ‘peripheries’, but they also create new ones. In the recent few years, China’s Belt and Road initiative has intensified the competition

between European, North American, Australian and New Zealand institutions, for whom Chinese students constitute a significant portion of income (Robertson, 2017). In this sense, the Covid-19 crisis only rendered visible – or more visible – the degree to which contemporary networks of knowledge production were deeply rooted in the global economic and political order. This, importantly, is the case regardless of the degree to which specific institutions or systems are ‘internationalized’. Even seemingly protectionist policies, such as educating students for the (national) labour market, are oriented towards economic growth, which takes place in the context of global competition (Bacevic, 2014). This means that thinking about knowledge production beyond ‘growth’ requires thinking about the future of capitalism and the global configurations of power that might arise from it.

Climate futures

In *Climate Leviathan: A Political Theory of Our Planetary Future*, Geoff Mann and Joel Wainwright (2018) theorize forms of governance that might arise in response to the reframing of the living conditions in a changing climate. They identify two main axes along which these configurations of the political might assemble: from capitalist to anti-capitalist; and from global, or planetary, to smaller-scale, from national to local. This produces a grid of four ideal-typical regimes, which they dub Climate Leviathan, Climate Behemoth, Climate Mao, and Climate X. While there are obvious limits to grid/group scenarios, this framing provides a good starting point for thinking about the relationship between knowledge production and geopolitical governance of climate futures.

Climate Leviathan and Climate Behemoth both assume the continuation of capitalism as the dominant mode of production. However, whereas Climate Leviathan assumes the continuation of some form of global governance – akin to the current role of the United Nations Intergovernmental Panel on Climate Change (UN IPCC) and the Conference of Parties (COP) – Climate Behemoth does not. In Climate Behemoth, states – or, possibly, smaller, warring entities – are left to address the consequences of climate change for themselves. Regardless of whether political units choose to focus on mitigation, adaptation, or some mixture of both, this approach retains capitalist accumulation as the primary goal of economy, but with possible protectionism applied to national markets. This, for instance, could be seen as Donald Trump’s strategy since the withdrawal of the US from the Paris Agreement in 2017.

The two remaining regimes, Climate Mao and Climate X, are characterized by departure from the capitalist mode of production. As can probably be discerned from the name, Climate Mao assumes the emergence of China (or a similar world power) as the planetary sovereign, steering away from the capitalist logic of accumulation and profit. Yet even if China could be reliably identified as anti-capitalist³ (cf. Szelényi & Mihályi, 2019; Zhang & Peck, 2016) at the present moment it is not entirely clear how the entirety of global production could be organized from one world-state. What is pretty certain, however, is that this level of global governance would need to depart significantly from the (at least in principle) voluntary participation that currently characterizes international cooperation, towards a more centralized and possibly authoritarian forms of governance. Of course, given so far extremely limited capacity of capitalist or market incentives (carbon trading and ‘offsetting’ schemes) to address climate change (Gunderson, Stuart & Petersen, 2018; Grumbach, 2015) this kind of solution might prove necessary to prevent the worst-case scenarios of warming of 5 degrees Celsius and above – providing, of course, there is a political actor capable of implementing it.

Last, but not least, ‘Climate X’ stands for the little-explored space of possibility that departs from both capitalism as the dominant mode of production and global governance as its mode of coordination. While there is a longer tradition of research and writing on utopian collectives, this kind of political organization has so far remained confined to small, self-sufficient communes or movements, like the Zapatistas. As Mann and Wainwright acknowledge, we needn’t paint too rosy a picture of what the future in which these forms of self-organization would become more numerous would look like. After all, most present-day self-sustaining communities exist at the ‘edges’ of capitalism, rather than completely outside of it (Grubacic & O’Hearn, 2016; see also Kallis et al., 2020). In this sense, we do not really know in what form they would continue to exist if it ended – and how, of course⁴. This presents a particular problem for thinking about knowledge production in post-carbon futures.

Post-Covid disaster capitalism?

Reactions of institutions of knowledge production to the Covid-19 pandemic so far have overwhelmingly followed the approach best described as ‘disaster capitalism’ (Klein, 2007; Klein, 2014). After initial expressions of care and gestures of solidarity, most institutions have resorted to cutting down staff and/or wages, either through flat-rate deductions or promotion and pay freezes. Networks of circulation and exchange of data (pre-print-servers such as ArXiv

as well as social media) were quickly matched by private sector investments or takeovers, compounding the tendency for seemingly ‘free’ knowledge to become enrolled in the logic of capitalism (Bacevic & Muellerleile, 2018; Kelty, 2014).

Fears of declining numbers of international students and the possibility of ‘domestic’ or home students deciding to defer have led universities in the US and the UK to push for the resumption of in-person teaching. Similarly, the possibility that the US Government may revoke visas to international students whose courses have shifted online suggests an intensification of the relationship between universities, immigration regimes, and border control (Giroux, 2007). Stronger integration between state-governed mechanisms of surveillance and forms of international mobility – along the lines already present in the UK, where universities and research institutes are required to report on their international staff – could eventually give rise to a ‘Knowledge Leviathan’, with internationally-coordinated mobility of the highly skilled, and stronger, if not impermeable, borders for everyone else. On the other hand, it is also possible that the tendency towards centralization and agglomeration of teaching and research would compound the nationalization or protectionism of certain regimes.

Under conditions of capitalist competition – those that would, presumably, characterize both ‘Climate Leviathan’ and ‘Climate Behemoth’ regimes – it makes sense to assume that the pressure on institutions will be to return to ‘business as usual’ as quickly as possible. This, so far, has mostly taken the form of prioritizing the kind of education and research that can generate profit – from programmes highlighting ‘employability’ (like business and marketing) to commercial research that offers the possibility of developing and patenting technologies that provide a competitive advantage in the new climate – the Coronavirus vaccine being the most proximate, and urgent, one. Another strategy has been to tie education and research more closely to the state, with subsidized programmes that are projected to directly contribute to economic competitiveness, and others – most likely arts and humanities – left to ‘the market’.

Of course, institutions are differently positioned in relation to the possibility to carry on with ‘business as usual’. In the first period following the pandemic, we may see a wave of closures, either through bankruptcies, or through mergers and takeovers, with smaller institutions being ‘swallowed’ by larger, more resilient ones. This might introduce a distinction between institutions that continue to operate on a ‘global’ scale, attracting international students (and fee income), and those that focus on more ‘localized’ provision. Some universities would

probably continue to attract students (and, to a smaller degree, staff) from across the globe, retaining the majority of education and research operations in existing (or new) buildings on campus. This kind of knowledge production tends to be most carbon intensive, as it requires both travel – both in terms of students relocating from other countries, and in terms of staff commuting to work – and campus-based resource use.

The other distinction will probably be between institutions that shift to decentralized, online delivery, and those that prioritize in-situ training. While the former is the model most universities have been forced to temporarily transition to during the Covid-19 pandemic, there are reasons to believe that the predominantly online or ‘blended’ offline/online learning model would become more prominent in the future. It would be a mistake, however, to assume online learning would necessarily be more climate-friendly. Digital technology comes with its own, rapidly growing, footprint. A study in 2015 estimated cloud computing is responsible for 2% of global emissions, on par with emissions from global aviation (Greenpeace, 2015); a more recent report puts it at 3.7%, predicted to grow by 8% annually (The Shift Project, 2019) – and this was all prior to the big ‘online transition’ stimulated by the pandemic.

These statistics, however, cover only a fraction of digital technologies’ impact. Emissions are also produced by the manufacture, shipping, and disposal of digital technologies, including their energy consumption when ‘offline’. Furthermore, access to ‘high-speed’ internet is both carbon intensive and distributed in ways that are socially unjust (Allman & Hazas, 2019). In a rapidly destabilizing world, institutions of knowledge production that are most likely to survive will be those that have access to technologies and data that will allow them to adapt to a shifting climate. This includes not only data (weather satellites, meteorological observations) but also the ways in which people, communities and societies are responding to, adapting, or suffering in the climate crisis. The impact of climate change on grid stability and energy provision is likely to exacerbate these inequalities.

Of course, there are many ways in which institutions can be made ‘greener’ or more efficient in terms of energy use. Universities that have access to land could develop, or, where existing, extend sustainable food production in order to become both self-sufficient and to contribute to local food resilience⁵. They could also provide shelter during extreme weather events, generate energy (wind, water, solar) that could be shared the local population, and provide services such as hospitals, nurseries and schools for local residents. This might compound the existing trend

of ‘science parks’ or ‘innovation campuses’, with spatial integration of research, innovation, and production. Universities and research institutes would thus increasingly become ‘total institutions’ (Goffman, 1961), morphing the public and private (or economically and socially reproductive) sides of life.

However, there is also a possibility that these institutions will become increasingly insulated – both spatially and conceptually – from the ‘outside world’, especially under conditions of political instability. In the future, institutions of knowledge production may come to resemble the scientific compounds described in Margaret Atwood’s *MaddAddam* trilogy (2009, 2010, 2014) – self-enclosed communities mutually connected by high-speed trains, and protected from the poverty, chaos, and (climate) instability on the outside by walls and security guards. This model converges with the scenario in which political futures entail disintegration into smaller, conflicting city-states or statelets, along the lines of ‘Climate Behemoth’.

Innovation and science campuses are, of course, not limited to capitalist modes of production. In this sense, it is quite possible that the knowledge production complexes could be enrolled to support centrally planned economies of the sort Mann and Wainwright depict in ‘Climate Mao’. While there are reasons to believe this kind of massive coordination is already underway in China, it is difficult to see how the centralization of knowledge production would, in itself, lead to the reduction of carbon emissions unless accompanied by an overall reduction in resource use. One of the paradoxes of central planning is that it can ensure the most rational and resource-efficient distribution of resources, but only under the assumption that systems are relatively stable. In this sense, forms of disruption or instability that will become more frequent – extreme weather events, grid and infrastructure failures, and public health problems (see Hartmann, 2018) – would all limit the capacity of this kind of system to adjust to rapid changes.

This leaves the kind of knowledge production that might arise in small, decentralized communities based on mutual aid and similar principles of cooperation – the kind of political future Mann and Wainwright label ‘Climate X’ (see also Hamed Hoseini et al., 2020). This mode of knowledge production calls for the longest stretch of imagination, in part because, as this essay argued, thinking about knowledge production is itself rooted in the history of capitalism. This means we need to be careful about the romance of localism (Patomäki, 2018), without a clear plan on how to ‘divest’ not only from visible ties with the fossil fuel industry, but also from our own dependence on networks of global capital.

The Covid-19 pandemic allowed a ‘pre-view’ of the degree to which knowledge production draws on the extractive and connectionist logic that fuelled the climate crisis. The grounding of international flights demonstrated, for those who may have remained blind to this previously, how dependent institutions in the ‘Global North’ are on fees from international students. Closure of campuses, schools, and offices made obvious the degree to which academic knowledge production – and that includes our own – relies on multiple forms of labour, including childcare, care for the elderly, and the provision of food and other necessities. An overwhelming portion of this labour is performed by women, reflected in stark gender inequalities in data reported on rates of submission to peer-reviewed journals since the start of the pandemic (Minello, 2020). Yet an equally significant, but even less visible portion is performed by underpaid precarious labourers of all genders, many of them migrants with few rights or protections, like the agricultural workers flown in to harvest asparagus in Germany.

This ‘selective ignorance’ of the material and infrastructural affordances of knowledge production creates not only a lack of resilience – including in situations like disruptions of food supply chains, likely to become more frequent in the future – but also enables the continuation of exploitative labour relations that underpin modes of capitalist production. This demonstrates that environmental justice and labour justice cannot be separated (Hampton, 2018), despite organized labour’s somewhat ambiguous relationship to the climate crisis (see Stevis, Uzell & Räthzel, 2018).

In their masterful argument for rethinking the main paradigm of economics in the aftermath of the Covid-19 crisis, Carolina Alves and Ingrid Kvangraven write:

Situating the economy in society enables exploration of the intricacies between the economy and nature, for example, by food systems researchers or ecological economists...to scholars with a broader understanding of how production affects food and ecological systems, the rise and spread of Covid-19 was less of a surprise. Such a perspective starkly contrasts to viewing the pandemic as an exogenous shock. Therefore, it is now time to emphasise that capitalist production is intertwined with nature and cannot be seen as separate – an important lesson for many heterodox economists as well (Alves & Kvangraven, 2020:4).

And go on to argue:

The inherent instability of capitalism and the need to put distributional conflicts at the centre of any economic analysis is also a recurring characteristic of heterodox approaches...the low wages among essential workers are determined by policy, rather than being a reflection of a market-determined price. Some of these weaknesses bluntly exposed by the pandemic include the high degrees of homelessness, precarious workforces, and poverty.

In this sense, drawing attention to infrastructure serves to underline the way in which our own projects, including projects of reform, rely on modes and relations of production that are part and parcel of the climate crisis. Similar to how ‘soup, salmon and ducklings’ in Virginia Woolf’s *A Room of One’s Own* (1929) reveal the gender inequality fuelling Oxbridge scholarship, thinking about how thinking about post-carbon futures itself relies on capitalist forms of production gives us a good starting point from which to apprehend the scale of change necessary. From this perspective, we can ask any number of questions – who gets an internet connection? Who maintains our libraries? Who harvests the vegetables for our casseroles or mills and packs ingredients for our sourdough? – to start thinking seriously about what disruptions in food supply, grid failures, and, not least, social inequalities, mean for the future of knowledge production.

Conclusions

This essay argued that thinking about the futures of knowledge production in climate emergency requires us to engage seriously with the degree to which the history of contemporary knowledge production is rooted in the history of global capitalism, including colonialism and extractivism. This requires undoing not only of modes of production (capitalism) *or* habits of thought (Occidentalism, Eurocentrism) that have arisen as a consequence of this history, but of the modes of production *of* thought that are, themselves, its product.

Recognizing that our knowledge practices do not only reflect the legacy of these modes of exploitation, but directly benefit from them, requires us to think carefully about projects of reform. This highlights the ownership and management of infrastructure (Easterling, 2016) as one of the key questions for the future of knowledge production. Arguing for a decolonized curriculum or an ecological economics remains little more than perfunctory if we are not prepared to rethink our own reliance on modes of socioeconomic reproduction that sustain – and amplify – the climate crisis (cf. Spash, 2017; see also EXALT project at the University of

Helsinki⁶). In this sense, online learning, working from home, and bread-baking should not be seen as ‘minor disruptions’ to business-as-usual: instead, we they should force us to acknowledge the material and immaterial affordances of our own knowledge production.

To foreground knowledge infrastructures, then, is to foreground not only the future of the world, but our own role in it. Without paying attention to these elements, we are left to the project akin to building electric cars without roads or ways of life that support them (Morgan, 2020; Mattioli et al, 2020), or advocating Open Access without acknowledging how status inequalities intersect with the valuation of academic labour (Bacevic & Muellerleile, 2018). In other words, not only do we fail to engage with the material ‘base’ of knowledge production, we fail to acknowledge the ways *not* thinking about certain forms of material and immaterial labour precludes certain kinds of political futures.

To think about knowledge production in post-carbon futures requires us to engage with these forms of exploitation at the same time as we argue for transition to clean energy, better working environment, and anti-neoliberal curricula. This, in turn, is to foreground issues of justice and distribution. After all, surviving in a changing climate will require an extensive sharing of knowledge. Whether this knowledge will be used to create competitive advantage for individuals, countries and other political units, or whether it can be used for the benefit of all, is the key political question for climate futures.

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¹ For instance, the University of Cambridge recently saw the establishment of the Centre for the Study of Existential Risk (CSER) and the Centre for the Future of Intelligence (CFI); the University of Oxford hosts the Future of Humanity Institute; Digital Futures Institute is a new major investment at the University of Bristol; and Lancaster University's Institute for Social Futures was founded in 2015.

² There is an extensive literature dealing with the relationship between capitalism and academic labour, in particular precarity and casualization. The constraints of space in this article made it impossible to engage with in detail, but see e.g. Gill, 2014 as well as Bacevic & Muellerleile, 2018.

³ This, of course, would be an entirely separate discussion, but my view is that it cannot.

⁴ David Harvey recently provoked an outcry on the Left by suggesting that capitalism was 'too big to fail', in the sense of awareness that there are currently no guarantees any political movement or societal formation could survive broad-range destruction of current (capitalist) modes of existence. As unpalatable as it may seem, this analysis represents an accurate assessment of the current state of anti-capitalist movements (see e.g. Seymour 2020).

⁵ Issues related to land use are of particular significance for universities with endowments in the UK (like Oxford and Cambridge) or land-grant universities in the US; of course, ownership or use of land does not in and of itself prevent extractive and exploitative practices – see e.g. Christophers, 2019.

⁶ <https://www.helsinki.fi/en/conferences/exalt-2020/about-the-initiative>