Covid-19 and the politics of sustainable energy transitions

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Perspective

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ABSTRACT

In this perspectives piece, an interdisciplinary team of social science researchers considers the implications of Covid-19 for the politics of sustainable energy transitions. The emergency measures adopted by states, firms, and individuals in response to this global health crisis have driven a series of political, economic and social changes with potential to influence sustainable energy transitions. We identify some of the initial impacts of the 'great lockdown' on sustainable and fossil sources of energy, and consider how economic stimulus packages and social practices in the wake of the pandemic are likely to shape energy demand, the carbon-intensity of the energy system, and the speed of transitions. Adopting a broad multi-scalar and multi-actor approach to the analysis of energy system change, we highlight continuities and discontinuities with pre-pandemic trends. Discussion focuses on four key themes that shape the politics of sustainable energy transitions: (i) the short, medium and long-term temporalities of energy system change; (ii) practices of investment around clean-tech and divestment from fossil fuels; (iii) structures and scales of energy governance; and (iv) social practices around mobility, work and public health. While the effects of the pandemic continue to unfold, some of its sectoral and geographically differentiated impacts are already emerging. We conclude that the politics of sustainable energy transitions are now at a critical juncture, in which the form and direction of state support for post-pandemic economic recovery will be key.

1. Introduction

Covid-19 is, above all, a global health crisis with devastating implications for a great many as people lose their lives and as we live through an array of direct and indirect effects of lockdown and social distancing measures. This perspectives piece is written at a time when the pandemic is still unfolding, but some of its dramatic and varied impacts on the global economy, energy and financial markets, governance, and our ways of living are already evident. Our purpose here is to explore how the changes wrought by the pandemic might influence the complex and dynamic politics of sustainable energy transitions. This question is particularly pertinent now, as governments, companies, and wider publics consider what the pandemic means, how to respond and, importantly, the extent to which responses should be 'green'.

There had been some positive trends in the politics of sustainable energy transitions, as broadly defined below, in the years running up to the outbreak of the pandemic. For example, the Paris Agreement instituted nationally determined climate goals; sustainability transitions were placed on the agendas of many local, national and global governing bodies; the cost of renewable energy continued to fall rapidly, making it an increasingly politically and economically viable option; divestment campaigns were taking off; and there was a surge in public

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buy-into the argument that urgent action was required to address climate change. The hope was that COP-26, due to take place in Glasgow in November 2020, would see increased ambition to meet the goals of the Paris Agreement. Meanwhile, however, global greenhouse gas (GHG) emissions continued to rise rather than fall, albeit not in 2019 [1], and there remains a considerable emissions gap between the paths we are on and where we need to be [2].

Early reports of the economic impact of the pandemic, and the 'Great Lockdown', are bleak: the global economy is predicted to shrink by 6% in 2020, with the possibility that 300 million people lose their jobs [3]. There will, however, be significant variance in impacts with some sectors and countries harder hit, and some recovering more quickly than others. Predictions are that the open, service-oriented economies that dominate the OECD are likely to suffer more for longer [4], whilst China's economy is already showing strong signs of recovery. Equally, those economies already carrying significant debt and/or a reliance on fossil fuel exports are also likely to be harder hit.

In April 2020, almost 54% of the global population were subject to complete or partial lockdowns and, as such, the share of energy use that was exposed to containment measures reached 50% [5]. Unsurprisingly, therefore, the early implications of Covid-19 were also significant but varied for emissions, fossil fuel and sustainable energy. Daily global CO_2 emissions fell by 17% in April 2020, compared to April 2019, with just under half this reduction coming from surface transport as social practices changed [6,7], and expectations are of an overall 8% drop in 2020 taking emissions to levels of 10 years ago [5]. Lower emissions are connected, in turn, to energy use: demand for, and prices of, fossil fuels and electricity fell quite dramatically. The biggest drop was for oil, which saw a 25% fall in April 2020, with US oil prices falling negative for a period of time [5]. Renewable demand was, however, less affected and is expected to rise overall, by 1%, in 2020. As a result, the share of renewables within the overall energy mix may jump several years ahead of pre-pandemic expectations [5].

The debate has, however, already started to turn to what *kind* of recovery, in sustainability terms, we can expect. There is considerable concern that, as with the post-2008 recovery, there will be a rapid return to high levels of emissions and urban air pollution, and severe inequalities in terms of social outcomes. By May 2020 air pollutant levels in China had already over-shot their pre-crisis levels [8], whilst it is evident that a green recovery is not a luxury that all can afford and short-term survival strategies, that support business-as-usual, are underway in many parts of the world. At the same time, however, many are arguing forcefully that sizeable global stimulus packages provide an historic opportunity to drive sustainable energy transitions whilst, at the same time, delivering positive societal outcomes such as jobs, green growth and equity [3].

As such, the economic and social impacts of Covid-19 will do much to shape the politics of sustainable energy transitions over the next few years. We structure our discussions below around how important trends emerging in four thematic areas: energy system change; finance and investment; multi-scalar governance; and social practices, might be affected by Covid-19. Whist we recognise limitations in reaching conclusions at a time of rapid change and uncertainty, indications so far are that the pandemic overall is likely to be continuous with, and to accelerate, many of these trends. Our emphasis on the politics of transitions tends to foreground the notion that policy decisions taken as we emerge out of lockdown and into prolonged periods of social distancing will be vital to the success of sustainable energy transitions.

2. Defining the politics of sustainable energy transitions

It is important, before we proceed, to provide some key definitions. Sustainable energy transitions are conceived here as complex socio-technical processes of decarbonisation within energy systems, and involve both bringing in low, or zero, carbon energy and phasing out old, high carbon energy [9]. Our understanding of sustainable also includes due consideration for social issues of energy poverty, equity and justice. In turn, energy systems, old and new, are understood as being made up not just of supply, but also demand and social infrastructures [10]. Energy systems and practices are, of course, already undergoing sustainable changes, in particular in electricity, whilst there is significant variety between countries, in terms of pace, scale and technologies [11], partly related to political approaches to sustainability.

Politics is broadly understood here as consisting of power relations, formal and informal political processes, and their outcomes. Energy politics is increasingly *multi-scalar* in that it involves a growing multiplicity of actors at global, national and sub-national scales [10,12], a theme to which we return below. Sustainable energy transitions and politics are deeply intertwined: politics can shape the nature of energy systems, i.e. the degree to which they become sustainable, but politics is also, in turn, affected by energy systems [12,13]. This observation informs our choice of *energy system change* as one of our themes. Sustainable energy policy is, in turn, shaped by embedded power relations and institutions, but exists today because of the successful articulation of new ideas, particularly about climate change [10,12]. Within our definition, energy power relations also include institutionalised *financial* practices, and *investment* choices, that have long facilitated fossil fuel lock-in in energy systems [11], to which we return in Section 3.2 below.

Lastly, as part of our multi-actor view of the politics of sustainable energy transitions we consider *social practices*, and the role of the public, to be of paramount importance: as voters, particularly within democracies; as participants in political movements; and as consumers and, increasingly, generators of energy [6,14]. Indeed, habits, norms and culture, can be considered both a constituent element of existing energy systems [10], as well as a key aspect of how systems can change given the right political conditions [15]. This aspect of the politics of sustainable energy becomes particularly relevant given that lockdown led to, more or less temporary, new social practices.

Partly for these reasons, but also because of wider socio-technical lock-ins [16], sustainable energy transitions have frequently required conscious efforts by public actors to steer towards a more sustainable path. The nature of policy responses to the Covid-19 pandemic emerge as key given that these have the potential to speed up or slow down sustainable energy transitions [3,17,18]. Or, put more dramatically, to determine whether or not political pandemic responses prevent the world from leaping from the Covid-19 frying pan into the climate fire [17]. Equally it is important to consider whether Covid-19 has the potential to change the politics of energy and, if so, in what ways. We approach these questions by identifying *continuities and discontinuities* with sustainable energy politics trends, outlined above and below, and by thinking in terms of whether these trends are *accelerating or decelerating*. This is what we turn to next.

3. The politics of sustainable energy transitions under Covid-19

The below is clearly not intended as an exhaustive discussion of all possible implications of Covid-19 for the politics of sustainable energy. The thematic areas that shape the discussion tie in with our understanding of the politics of sustainable energy transitions outlined above, and are further informed by emerging analyses of the effects of the pandemic and related debates. What this represents is an early attempt at analysing complex politics at a time of ongoing change and uncertainty, with some emphasis on the OECD countries.

3.1. Energy system change

Questions of acceleration and deceleration highlight the importance of time frames, and the analysis below is sensitive to the temporalities of Covid-19: i.e. in some parts of the world, the short-term, defined as the period of lockdown, is over; whilst the medium-term can be defined as the period over which social distancing and recovery take place; and

the longer term, mid 2020 s to 2030, where the consequences of decisions made now will be most apparent [18]. What's key in this thematic area is the impact of the pandemic on the pace and nature of whole energy system change, an issue that was already the subject of considerable debate [19], on the growth of the low carbon energy system, and the looming demise of the incumbent fossil-fuel based system [20].

Historical price crashes and demand shocks left indelible marks on the evolution of the global energy system, and the current crisis is no different. The counterfactual when considering implications for whole energy systems is to consider what the structure of the global energy system might have been in 2030 had there not been a pandemic.

The *short-term* impact is clear: an unprecedented fall in energy demand, especially for oil, along with a more modest, but still significant, decline in electricity demand and prices.[1] After the March 2020 oil price war, OPEC + reached an agreement, that was subsequently supported by the G20, to reduce global oil production, but, as is always the case with such deals, the final outcome will only be perceptible later on. The initial impact on natural gas demand was more muted, but global production of liquefied natural gas was constrained by a lack of demand and the future is increasingly uncertain [21]. Coal demand in China was hit early by falls in industrial output and electricity demand, both have swiftly rebounded in China, but remained constrained elsewhere [5]. Natural gas and coal demand are both linked to power generation, the relative impact there was related to the extent and duration of the 'lockdown', and its varied impact on industrial activity, and this complicates matters in relation to coal, domestic gas and electricity demand [22].

Renewable power generation has fared relatively well, particularly in those markets where capacity is already significant, and it tops the merit order. At the same time, the pandemic has impacted on the operation of energy installations, such as offshore wind platforms, and also slowed the construction of new production facilities and infrastructure. First, because construction activity was hindered by new safety measures and second because the breakdown in international trade disrupted supply chains [23]. Indeed, the IEA, forecasts approximately 13% less growth in 2020 than in 2019, with growth rebounding in 2021 which is a *discontinuity* with pre-pandemic trends, albeit the growth of renewables as a percent of the overall mix is *continuous* with longer-term trends [24].

The pandemic has also exposed the vulnerabilities of relying on international supply chains for vital healthcare products and appliances, and the energy industry has been affected here too. For renewables and batteries, government-ordained work stoppages and border and port closures have also led to a disruption of trade in materials, components and assembled goods [25]. As the reliability of global supply chains can no longer be taken for granted, governments and corporations are considering 're-shoring' essential and strategic industries, which typically includes the energy sector. As such, the pandemic might *accelerate* an ongoing trend of 'de-globalization' and the re-shoring of critical energy industries, especially those in which China has obtained a pivotal position in the supply chain and production line. Covid-19 has also underscored the need to closely monitor security of supply for certain minerals that are essential for the energy transition, including cobalt, nickel and copper [26].

In the *medium term* we will need to closely watch recovery programmes and the degree to which struggling fossil fuel companies are supported, and whether there are any decarbonisation conditions. And the struggle is apparent: already, many energy companies have slashed their investment plans, final investment decisions (FIDs) have been delayed and the longer-term prospects for new production are threatened, though not everywhere. The IEA estimates that total energy investment will fall by 20% in 2020 [27]. The LNG industry is instructive with FIDs delayed in North America and Mozambique, whilst prospects in the Eastern Mediterranean now seem bleak, although Qatar is going ahead with its expansion. As such, whether or not fossil fuel producing states decide to support their ailing producers is a critical factor in determining the medium-term oil, gas and coal outcome. The plight of the shale industry in the US is also instructive: the rig count has plummeted, production is falling, and bankruptcies are rising. Just as in 2014–15, the US shale industry will survive, but production will probably never return to its 2019–20 peak [28]. This will take the shine off US 'energy dominance' with potentially wide-ranging geopolitical consequences.

Although it is still early days, companies invested in renewable energy are more optimistic about their future, but it remains to be seen whether international oil companies (IOCs), such as BP, Shell and Total, will accelerate their diversification into 'new energy' as they grapple with the loss of fossil fuel revenue. Much also depends on the pace and scale of demand recovery, but there are those who argue that 2019 might turn out to be the date of global peak fossil fuel demand [29], and, as such, in hindsight Covid-19 may be viewed as having accelerated the demise of fossil fuels.

The long-term outlook will be shaped by the pace of economic recovery and the *degree* to which the trillions of dollars of government stimulus support fossil-fuel incumbents and to which they accelerate clean energy production and demand side management. Equally, reduced electricity demand growth may weaken the appetite for new coal power in emerging economies. The sentiment of the financial sector is also a critical factor here, and, see below, accelerated fossil fuels divestment seems one likely outcome [17]. The medium-term cuts in investment in production, discussed above, may result in high oil and gas prices and volatility in the second half of the decade, although BP have revised their long-term oil price outlook, and announced a USD 13bn to 17.5bn write-off [30].

However, it is worth remembering that over 80% of states are not net fossil fuel exporters. The very prospect of future high oil and gas prices may accelerate the transition away from such fuels; and fossil-fuel demand destruction would gather pace, which would constrain prices. Thus, we can conclude that, for most states, investing in the low-carbon transition is a win–win strategy that both stimulates economic recovery and reduces the cost of future fossil-fuel imports.

3.2. Finance and investment

An historically intransigent aspect of sustainable energy transitions has been the financial practices that have heretofore supported fossil fuel industries, as well as the financial power of many incumbent actors. Transnational, and national, oil and gas companies have kept up investments in long-term projects; coal investments, often by Japan and China, have continued in developing countries thereby underpinning the expansion of coal fired electricity; whilst state subsidies for fossil fuels continue to far outstrip support for sustainable energy [31]. Prior to this crisis, and the implications for fossil fuel companies listed above, these investment practices were partly responsible for locking-in difficulties associated with phasing out fossil fuels [11].

Over the past few years, however, there have been growing moves to divest away from fossil fuels by increasingly high profile private and quasi-state actors in many OECD countries. There is also growing recognition of financial risks associated with continued fossil fuel investment, as well as re-evaluations of fossil fuel reserves associated with concerns about stranded assets. Lastly, energy policy has played a strong role in, directly or indirectly, supporting investment in renewables, energy efficiency, grid improvements, and storage – albeit investment levels remain too low [32].

Evidence thus far suggests that the implications of Covid-19 may accelerate some of these more recent trends. The stronger demand and price performance of green energy compared to fossil fuels through the

[1] Electricity prices in Europe had already been falling as a result of increased renewable capacity so the pandemic impact, again, tends to amplify existing trends.

crisis is a core aspect of expected longer-term sustainable energy transitions [9]. This potential for relatively improved financial returns for green versus brown energy is further underpinned by recent analysis showing superior investment returns from renewable versus fossil fuel shares since the pandemic, and indeed over the past 5 years [32]. We have already seen, above, that low oil and gas demand and prices have resulted in falling investment in, especially, US shale but also a range of other petroleum provinces. There is also, however, and this is more of a discontinuity with existing trends, potential for a fall in investment flows into coal plants as economic growth in emerging economies weakens [20].

It is also important to also think about *who* is investing at the moment given that so many national governments, and some international actors, are currently implementing, and devising, significant rescue and stimulus packages which might offer an historic chance for sustainable investment [33]. Indeed, the IEA has already pointed out that 70% of funds invested in energy come, directly or indirectly, from the state [33], and that governments, globally, are planning to spend USD 9tn in the next months on recovery packages [3]. Thurs far, short-term government spend has been focused on reacting to the health challenge and protecting livelihoods, jobs and businesses and, as such, tends to support 'business-as-usual' [35]. Indeed, a point of comparison regularly made is with the recovery process post 2008 which, given limited green stimulus, returned the world quite quickly to an upward trajectory of emissions [5,17,36].

There is more hope, however, this time around, of medium and longer-term stimulus packages leading to green outcomes. Significant cleantech market progress [37], mainly in efficiency and electricity sectors, means that 'business-as-usual' in energy *is now greener* than in 2008 for a lot of countries. What can be inferred from this is that, for those countries that have strong and/or growing cleantech sectors, focusing investments on green energy may well mean effective short- and medium-term stimulus. Hepburn et al [17], argue that green investments, for example in energy efficiency building retrofits, renewables, and clean energy infrastructure, can be delivered quickly and have high economic and jobs multipliers, see also [38,39]. Indeed, relative fossil fuel and sustainable energy share performances and the longer-term demand outlook for oil and coal provides more evidence to support the argument that sustainable initiatives offer superior *economic* returns for government spending [17], as well as contributing towards longer term resilience and national emissions targets.

Although the evidence base for green stimulus is much stronger this time around, it is not yet clear whether, or to which extent, policy-makers in OECD countries will choose that path. What is clear is the emergence of high-profile, and widely disseminated, arguments that state actions in this time period are crucial to a recovery that supports, and perhaps even accelerates, sustainable energy transitions [3,17,40]. It is also worth noting that there will be *significant variety* in whether countries pursue green stimulus, partly in relation their existing commitments to sustainable energy, and how financially embedded clean and fossil fuel energy sectors are.

3.3. Multi-scalar policy and politics

Sustainable energy transitions have played out against an historical backdrop of globalisation – in the sense of increasing interdependence of energy systems, global supply chains, and energy-associated externalities – albeit more recent trends, exacerbated by the pandemic, have been towards 're-shoring'. Yet, there has been a general lack of coordinated and inclusive global energy governance that spans across all actors and sectors. The historically dominant global governance institutions typically consist of either producer or consumer clubs, and they tend to be preoccupied with energy security (of supply or demand) rather than with decarbonization per se [41].

The last decade, however, has seen major innovations in intergovernmental governance, notably the creation of the International Renewable Energy Agency (IRENA) in 2009, the adoption of UN Sustainable Development Goals, and the Paris Agreement. The latter, in particular, now requires most national governments to devise and regularly update their climate pledges, the so-called Nationally Determined Contributions (NDCs). While this has prompted countries like the UK and regions like the EU to adopt or propose net zero emission targets by the middle of the century, other major players, most significantly the United States, have backtracked at the national level. Even within the EU there are divisions: most western EU member states have embraced the energy transition as a means to green and diversify their energy supply, and as an industrial opportunity, whilst many eastern EU members are more reluctant, for example Poland is opting to secure jobs in coal [54]. In this sense, the world in general and the EU in particular face a multi-speed energy transition.

The Paris Agreement has, importantly, both underpinned the notion of sub-national and non-state action and galvanized new actors, including cities, civil society groups, investors, transnational movements and corporations. Overall, one could say that the site of sustainable energy governance has been gravitating away from multilateral diplomacy and across national, transnational and local scales [42]. This dynamic was explicitly supported by the Paris Agreement which, in starting from nationally determined pledges, took an explicitly more bottom-up approach. As things stand, however, policies and regulatory frameworks in almost every country are insufficient in terms of reaching the new emissions targets [2].

Such was the state of affairs when Covid-19 struck. The pandemic will have multiple implications for multi-scalar energy governance. One immediate consequence is that the COP26 climate summit, which was planned to take place in November 2020 in Glasgow, has been postponed by a year. This raises the possibility that the US is represented at the COP by a new administration with a more positive climate stance, depending on the outcome of the upcoming US elections. More broadly, the response of governments to the Covid-19 crisis thus far seems to bode ill for the system of multilateral cooperation. Regional and international organizations from the EU to the UN have struggled to muster a coordinated response to the pandemic, the US has announced its withdrawal from the World Health Organization (WHO), and geopolitical tensions between China and the United States have escalated. The frailty of the current system of global cooperation might reinforce the decentralization of energy governance from the multilateral to national, transnational and local scales marking some *continuity* with direction of travel in governance. It will also be interesting to see in this regard whether, for example, Covid-19 exacerbates or diminishes the aforementioned differences in speed and enthusiasm with which the EU member states pursue the energy transition and how the European Commission will cope with that.

Another impact of Covid-19 on the multi-scalar nature of sustainable energy governance is that the role of national governments has been stepped up, markedly in many places, in order to respond to the pandemic [3,17]. Indeed, the pandemic has led to levels of government intervention in markets and private life not seen in many decades and, as such, marks some *discontinuity* with longer term trends. The effectiveness of government intervention, however, will partly depend on their economic and institutional capacities [43], which may be stretched thin as a result of the unprecedented responses required so far to Covid-19. At the same time, there is also evidence of cities around the world responding quite rapidly, often by changing transport modes and enabling distancing while travelling [20,40,44], sometimes even as national governments take a different course. Again, this appears to be an *acceleration* of the pre-Covid-19 trend of greater multi-scalarity in how energy is governed, as the pandemic so far shows signs of re-localizing and re-calibrating places and spaces of energy governance.

3.4. Social & political practices

Clearly, how different social groups are affected by sustainable

transitions differs markedly between and within countries. Those employed within fossil fuel industries may feel very differently from those living within regions at high risk from rising sea levels – hence recent calls to adjust for such inequalities when governing for sustainable energy transitions [11].

Within many OECD countries, however, in the years immediately preceding Covid-19, public support for action on climate change was at an all-time high [17,18]. For example, mass transnational movements, like Extinction Rebellion and the Youth Climate Movement, took a considerable step up in the late 2010 s, whilst opinion polls showed increasing levels of concern about climate change as well as support for solutions, like renewables. Reports, in particular IPCC 1.5 degrees [45], provided a far clearer picture of the human and social implications of not mitigating, whilst more publicly visible, physical evidence of climate change had also been mounting. All of which led to a consensus in many OECD countries that the 2020 s are vital for action to mitigate.

At the time of writing, June 2020, much of society is understandably focused on human security, improved health, protection of jobs and incomes, and economic recovery. Those working in high carbon and clean energy industries will seek support as part of recovery packages. Arguably, however, pre-Covid-19 surges in support for climate action as well as how attitudes evolve during the pandemic will be important considerations for policymakers as they make decisions about what priority they give to green stimulus, and to developing much needed new sustainable policies over the medium term.

This, in turn, raises the relevance of debates in the public sphere, across newspapers, social media and civil society, on what a post-Covid-19 world will look like – i.e. the 'new normal'. One of the key outcomes of lock-down and ongoing social distancing has been considerable, albeit partly non-voluntary, changes in social practices – including in mobility and work practices [7]. Transport has been one of the hardest hit sectors, especially air, rail, car and bus travel, as people have stayed home. By contrast, in many countries walking and cycling has proven the obvious travel replacement for shorter journeys [7,46]. As we have seen, these practice changes have had clear implications for oil demand, whilst reduced high carbon travel has been a major contributor to Covid-19 related emissions reductions. The key question here is whether social practice changes persist firstly beyond lock-down, and then through social distancing phases – i.e. staying with the example of transport, will demand for transport overall be lower longer term, and how will transport choices differ?

There are various clues that we can consider in relation to this question. Firstly, in terms of preferred modes of transport, some national and many local governments, as mentioned above, have announced new policies aimed at structurally reinforcing moves towards cycling and walking within cities. Conversely, with relevance for longer journeys, social distancing lowers demand for public transport, which may mean a switch to more car journeys for those that have that choice. At the same time, however, although car sales have fallen dramatically, and car companies are amongst those clamouring for government support, electric vehicle sales are still up globally [47].

Secondly, lockdown has provided new evidence about the effectiveness of working from home, not least due to the time saved from not having to commute [3,7]. Because social distancing also affects people's willingness to return to work, and some workplaces may not have sufficient space, the duration of social distancing is a key variable in determining longer term travel demand. This is also because, as some sociologists have noted [7], the longer the time period over which people are compelled to change practices the more likely some behavioural changes become new norms or habits. In sum, in terms of the carbon content of travel, Covid-19 appears so far to be *continuous* with and *accelerated* existing trends, like cycling and working from home, but may present some difficulties in the medium-term for policies encouraging public transport as an alternative to cars.

Lastly, when thinking about public responses to the pandemic, there is evidence emerging that Covid-19 has demonstrated, in more vivid terms, links between human activity, biodiversity loss, environmental degradation and health [48]. Air pollution was already climbing up political agendas in many parts of the world and the WHO estimates that annually 4.2 million deaths result from exposure to outdoor air pollution [49]. Now it has also become a key focus within the pandemic. Various studies linking Covid-19 deaths with air pollution have been widely circulated, including comments from the WHO that if you are exposed to air pollution your chances of being severely affected are much higher [50,51].

At the same time, it has not gone unnoticed that air pollution has dropped significantly and, in the case of China, started to rise again as lockdown eases. Indeed, a recent IPSOS Mori poll, undertaken in Europe, shows not only that people have noticed the clean air, but that they are now asking policymakers to refocus on wellbeing over other indicators such as GDP [7]. Indeed, Covid-19, like climate change, was no 'black swan' event – there have been several warnings of a pandemic of this nature [52,53]. What Covid-19 has more widely demonstrated, therefore, is the devastating consequences of ignoring such warnings, thereby offering some potential to argue for an *accelerated* shift in political focus onto long-term measures of broad resilience, and away from short-term gains.

4. Conclusions

It is clear that the pandemic occurred at a critical juncture in terms of the relationship between politics and sustainable energy transitions. State support and policy intervention have been key to promoting efficiency and accelerating decarbonisation of the energy system, particularly in a just manner, and now the need for the state to invest to support post-pandemic economic recovery presents an opportunity to energise green growth.

Many of the main drivers of what happens next represent a *continuation* of processes that pre-date the pandemic. A key question that has emerged here is whether or not there will be an *acceleration* of trends towards a more sustainable future, or whether the desire to protect existing jobs and incumbent industry will retard the momentum that was emerging in some countries under the banner of a 'green new deal' or 'green growth'. One lesson from the 2008 crisis was that, when it comes to emissions, a rebound to the ways of old is as likely as not. However, this perspectives piece has found some reasons to think that this time might be somewhat different.

Given relative economic performances between fossil fuels and sustainable energy during the pandemic, there appears to be a greater chance of green stimulus this time around. Much also depends on whether changes imposed in the lockdown result in longer term behavioural and structural change in relation to issues like fossil fuel demand, air quality, and support for climate change mitigation. New global accords now exist, in the form of the Paris Agreement and the UN's 2030 Agenda and associated SDGs, that provide targets and direction for politicians and policy makers to strive towards and, importantly, against which increasingly active publics can hold them to account. Furthermore, the Covid-19 crisis has explicitly exposed a lack of political response to warnings of human disaster and of resilience in public health and welfare, which provides further support for arguments that a post-pandemic world should not be politics, or indeed business, as usual.

Rising diversity and inequality, both within and between countries, were also a hallmark of recovery from the global financial crisis, but these issues may well become even more significant as some parts of the world, Europe, some US states and cities, focus more on sustainable change, whilst others cannot afford, or will not be politically incentivised, to do so. Clearly, it will be critical to see what happens in the major economies but as over 90% of future demand growth between now and 2050 lies outside the OECD, the road to recovery in the emerging economies of Asia, Latin America and sub-Saharan Africa is just as significant.

The oil price crash that accompanied the pandemic has made clear the need for so the so-called 'Producer Economies' to finally put themselves on a more sustainable path, particularly if a green recovery results in an earlier peak in fossil fuel demand and an acceleration of permanent demand destruction. Failure of fossil fuel-dominated economies to adapt to such a trajectory will likely result in instability and conflict, both within and between states. In this context, there is an urgent need to explore further what these geographical diversities mean for the future politics of sustainable energy transitions, whilst not forgetting the growing significance of scale and diversity in political responses within countries.

Last, but far from least, there is the matter of publics and political participation. Some argue that publics will now be focused on jobs/recovery only, but there are some early indications that this is an oversimplification. Thus, it will be important that those policymakers tasked with ensuring sustainable transitions appeal to new behaviours, values, and evidence as they design recovery packages, alongside reviving some aspects of business-as-usual in the economy. It is in this wider societal context that academics can play a critical role in helping to understand possible futures, making clear that what is done today can shape those futures in a positive way. Rather like the archivist in the film, 'The Age of Stupid',[2] who in 2055 reflects back on why society failed to take the actions necessary to avoid catastrophic climate change, we do not want to look back on 2020–21 as a time when we were unable to turn a global health crisis into an opportunity to finally put the world on a more sustainable path, both in terms of human security and environmental sustainability.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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