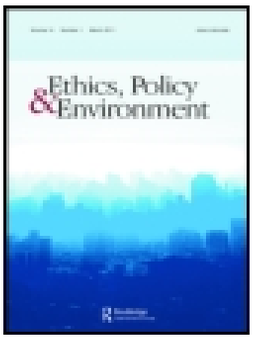

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Rationing and Climate Change Mitigation*

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ABSTRACT

In this paper, we argue that rationing has been neglected as a policy option for mitigating climate change. There is a broad scientific consensus that avoiding the most severe impacts of climate change requires a rapid reduction in global emissions. We argue that rationing could help states reduce emissions rapidly and fairly. Our arguments in this paper draw on economic analysis and historical research into rationing in the UK during (and after) the two world wars, highlighting success stories and correcting misconceptions. However, although the empirical details play an important role, the paper is primarily based on philosophical and ethical argument and policy analysis, particularly highlighting the normative assumptions behind policy choices.

We build on Hugh Upton's work in healthcare ethics, rejecting a broader conception of rationing which conceals significant distinctions between policy options, obscuring the specific advantages of an egalitarian conception of rationing. While some argue for the modernisation of rationing, introducing tradable allowances, we argue that the rejection of markets, and a commitment to fair shares, is a key part of the value of rationing, and precisely what made rationing attractive to the public in the 1940s.

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Tradable energy quotas; Carbon allowances; Carbon Tax; Energy justice; Fairness; Equality

1. Introduction

This paper argues that rationing has been neglected as a climate change mitigation policy option. Indeed, it may be that it is not merely neglected, but is considered by many to be an *unpalatable* option. Raj Patel has suggested that 'rationing is about as acceptable a topic of conversation as hemorrhoids' (Patel, quoted in (Cox, 2013, back cover)). In this paper, however, we argue that rationing could plausibly play an important role in an effective and fair means of reducing emissions and is therefore worthy of serious consideration. One of few authors to explicitly propose the adoption of rationing to mitigate climate change is the historian Mark Roodhouse. In his discussion of wartime rationing, Mark Roodhouse explains that 'in 1939 and 1940 the government rejected proposals to

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*This paper was jointly authored by Nathan Wood and Rob Lawlor, drawing on research (including archival research) on the two world wars by Josie Freear.

#Josie Freear has now left academia, to join the medical profession, but has approved this submission.

rely upon increased taxation to cut consumption because the impact of tax rises would be slow and inequitable' (Roodhouse, 2007). This quote highlights the fact that, as well as being fairer than taxes, Roodhouse considers rationing to be *more effective* in achieving results *quickly*. Writing about climate change in particular, Roodhouse concludes that rationing would be more effective than a carbon tax if a government wanted 'to reduce carbon emissions *quickly and dramatically*' (Roodhouse, 2007).[1]

This paper aims to add detail to Roodhouse's initial proposal, partly by adding some more historical support for Roodhouse's conclusion (in section 2), but primarily by developing an ethical case for rationing carbon emissions (sections 3 and 4), and responding to objections and highlighting misconceptions (section 5).

Some might challenge our assertion that rationing has been neglected, arguing that various rationing schemes have been developed, such as Personal Carbon Trading (PCT) schemes (Also see Sodha (2019)). However, we contrast rationing (in the narrow sense) with these other policies, and (in section 3) we argue that these policies only count as rationing in the broadest sense, and we should resist this broad understanding of rationing. We defend a narrower, egalitarian conception of rationing (ECR), and we argue that this form of rationing has advantages over PCT, such that rationing (ECR) needs to be taken more seriously by academics and policy makers (and ultimately the general voting public).

2. Methodology, Background and Context

2.1. Methodology and Scope

As noted in the abstract, although this paper is primarily based on philosophical and ethical argument and policy analysis, particularly highlighting the *normative* assumptions behind policy choices, there is also an empirical element, drawing on historical research. This historical research focused on the example of rationing in the in the UK during (and after) the two world wars, and included original archival research, in addition to an examination of the existing literature. The archival research was conducted by Josie Freear, a historian with expertise in this area of history.

Obviously, we acknowledge that this is only one time and place in history, and there are other examples of rationing that one could focus on. One could look at rationing in other countries during Second World War, such as the USA. Or one could look beyond the two world wars, and consider, for example, the siege of Leningrad. It is possible that, if we look at other historical examples, there may be different experiences, and potentially different lessons to learn. That is a possible area for future research, and we would encourage others to explore other examples. But the UK perspective was our focus, and it is a natural one – as it is the most extensive, long lasting, and successful example of rationing in modern history – demonstrating what can be achieved with rationing.

This also brings us to the topic of scope, more generally.

A policy of rationing could be compared to any number of policies, such as investment in alternative energy sources or better transport policy. This paper does not compare rationing with these policies. If we can reduce greenhouse gas (GHG) emissions sufficiently by investing wisely in clean energy, without needing to make additional changes at the level of individual consumers, we would not insist on rationing regardless. More generally, we could argue

about the extent to which states should focus on individual consumption versus for example, energy policy, but this is not a debate we intend to engage with here. Rather, our aim in this paper is to compare rationing with its closest neighbors. That is, we will compare rationing with other policy proposals which similarly aim to reduce emissions by reducing individual consumption – namely, tax-based solutions and tradable carbon allowances.[2]

In contrast to rationing, these policies receive serious attention, in academia, in policy debates and (at least in the case of tax-based solutions) in the wider public debate. As such, the aim of this paper is modest. Our aim is to argue that rationing is *at least* as deserving of serious consideration as the other policies discussed in this paper.

Finally, it is not our aim, here, to specify and to defend one particular approach. There are many ways in which policy makers could make use of rationing (most likely alongside other policies). In section 4, however, we will present, in broad terms, two contrasting approaches which we believe could be promising options. We do not argue for one over the other, and neither do we rule out other alternatives, and neither will we specify what should be rationed and what should not, but we do consider these two examples to be *illustrative* of how rationing could play a role in mitigating climate change.

2.2. Climate Change

The IPCC (2018) report concluded that greenhouse gas (GHG) emissions would have to be cut by 45% by 2030 to meet the Paris Agreement's 1.5-degree target (IPCC, 2018). Meeting this target by 2030 could mean the reduction of sea level rise, fewer severe weather events, reduced species loss, lower impacts on terrestrial freshwater and coastal ecosystems and the benefits they provide to humanity, reduced climate related risks to health, livelihoods, food security, water supply and human security (IPCC, 2018). And the most recent IPCC report has further confirmed the severity of these risks (IPCC, 2022). Current emission reduction pledges could still see global temperatures increase more than 5°C (Robiou du Pont & Meinshausen, 2018).

Attempts to construct policies to reduce GHG emissions have culminated in a range of proposals to curtail the consumption of fossil fuels and emission-intensive goods. The most prominent of these take the form of tax regimes or market-based mechanisms, which have been advocated by international organizations over the past two decades (Gupta & Mahler, 1995; Ross et al., 2017). The taxation of fossil fuels is considered one of the most efficient/cost-effective ways for states to reduce emissions (Meckling et al., 2017; Rentschler & Bazilian, 2016). However, we must also recognize that there is often a tension between fairness and efficiency, with each consideration pulling in different directions (Sandel, 2012; Vatn, 2008). Many existing emission taxes, for example, yield regressive outcomes, disproportionately impacting low-income and vulnerable groups (Ayres, 1997; Bristow et al., 2010; Büchs et al., 2011; Callan et al., 2009; Feng et al., 2010; Wier et al., 2005).

O'Neill et al. (2018) performed an analysis of the resources required to meet human needs within a 'safe and just' development space, based on the Planetary Boundaries. They found that no country meets the basic needs of its citizens at a globally sustainable level. O'Neill et al. (2018) suggest two broad strategies that may help states move toward this level. First, adopting a focus on sufficiency i.e. reducing resource use without worsening social outcomes. Second, aiming for improvements to both social and physical provisioning systems, which they suggest may require reducing inequality, enhancing

social support and shifting to a focus on degrowth (O'Neill et al., 2018). The focus on sufficiency and the focus on inequality both push us in a direction that makes a focus on rationing natural and appropriate.

Here then, it is worth noting that there has been work done on decoupling human needs satisfaction from energy services (Brand-Correa & Steinberger, 2017; Steinberger & Roberts, 2010; Wood & Roelich, 2019). Satisfying our needs or attaining basic capabilities can certainly be done in less energy-intensive, and more inclusive, ways. This links back to O'Neill et al. (2018) and the important intersection between sufficiency and inequalities in reducing resource use without worsening social outcomes. In this sense, it seems natural that we would pursue egalitarian policy, like rationing, which we will argue could go hand-in-hand with other structural changes that meet human needs in more inclusive and less resource-intense ways.

In addition, current failures to phase out fossil fuels mean that future governments may have to take *rapid* action to reduce emissions if and when they decide to do so. As governments continue to put off significant action until 'tomorrow', it is likely that, by the time governments decide to take significant action, we will need to reduce emissions *urgently*. Indeed, based on the 2018 IPCC report, we are probably already at that point (IPCC, 2018). Again, this is another consideration that pushes us to take rationing seriously (see the Roodhouse quotes above).

2.3. Rationing in the Two World Wars

Rationing is often seen as unattractive, and therefore not a viable option for policy makers (Rosoff, 2014). As such, it is important to highlight the fact that this was not the case for many of those who had experienced rationing. And here it is important to emphasize the difference between rationing itself and the *scarcity* that rationing was a response to. Of course, people did welcome the end of rationing, but they were really celebrating the *end of scarcity*, and celebrating the fact that rationing was no longer necessary. But, as long as there was scarcity, rationing was accepted, even welcomed, or demanded.

Cabinet Office papers from the Second World War, reflecting on the experiences of the First World War, noted that appeals for people to *voluntarily* reduce their consumption had 'invariably failed'. The report went on to state that 'In the Great War the most potent cause of industrial unrest had been the maldistribution of foodstuffs, which had given rise to food queues'[3] and the war cabinet emphasized that:

> Public opinion would know that these injustices and inequalities could be avoided by the introduction of rationing. We now had sufficient experience of rationing to know what could be achieved by that means.[4]

Likewise, a Ministry of Food report from 1918 commented on the effectiveness of rationing, stating that the effects had been 'almost instantaneous'.[5]

Similarly, a Home Intelligence Report, from May 1942, identified trends in public feeling, as observed in a special report on South West England. It was reported that, with regard to compulsory rationing and appeals for *voluntary* changes in consumption, the British public showed:

> a complete and expressed *unwillingness* to make voluntary sacrifices, but an apparent readiness to face compulsory sacrifices without undue grumbling.[6]

Rationing aimed to distribute both goods and burdens (more) equally, regardless of wealth. And this was a key part of its popularity. In a report from May 1941, the Ministry of Information stated that:

> as long as people believe that all classes and sections are suffering and enduring equally, they will put up with very great hardship. It is 'unfairness' that people resent.[7]

Furthermore, the evidence clearly indicates that rationing was successful: despite the reduced quantity of food over all, during the period of rationing in the Second World War, cases of malnutrition went *down*, rather than up (Cox, 2013, pp. 34–35).

There are, of course, differences: the challenges posed by war are not identical to the challenges presented by climate change (these differences will be discussed more in sections 4 and 5). Nevertheless, it is worth considering the perspectives that economists of the time had on rationing. A.C. Pigou defended price controls and rationing in his 1921 book *The Political Economy of War* (Pigou, 2012, pp. 93–149). In contrast, in considering what should be done in the Second World War, Friedrich Hayek and John Maynard Keynes focused their attention on finding innovative *alternatives* to rationing. But even they – two of the most vocal defenders of tax-based alternatives – did not deny that price controls and rationing could be effective mechanisms for distributing goods, in certain circumstances. Thus, while it is fair to say that both Keynes and Hayek were broadly opposed to rationing, at least in the sense that they were keen to *limit* the need for rationing, two things are clear from their discussions of rationing and possible alternatives.[8]

First, both recognized the effectiveness of rationing (in distributing resources and avoiding queues and the negative impacts of inflation, while trying to reduce consumption). They were keen to avoid rationing *where possible*, but yet, rationing remained the fall-back option. Hayek, for example, acknowledged that 'Rationing and Government priorities may become necessary in particular instances' (Hayek, 1997, p. 151).

Second, it is clear that they recognized improved efficiency would come at a cost in terms of fairness. Their proposed alternative to rationing was to raise taxes. However, according to Bruce Caldwell, Keynes recognized that, if this was to be effective, the 'tax would have to be extended to the working classes', because

> a tax on the rich would not sufficiently reduce expenditure, so it would not help with the problem of excess demand for consumption goods. (Caldwell & Caldwell, 1997, p. 34)[9]

Finally, it is worth emphasizing that the tax-based solutions advocated by Keynes and Hayek were not implemented. As we will argue in section 5, this was not primarily a debate about economics (if we follow mainstream economists in seeing economics as an objective, value-free science[10]). Rather, it was a debate about *values*, and the evidence suggests that people simply did not share the economists' values: the public valued fairness over efficiency. And the public acceptance of compulsory, non-tradable rationing continued well into the postwar period, with Clement Attlee's Labour government winning by a landslide in the 1945 election with their policy of *continuing* wartime restrictions on consumption even after the war had ended.[11]

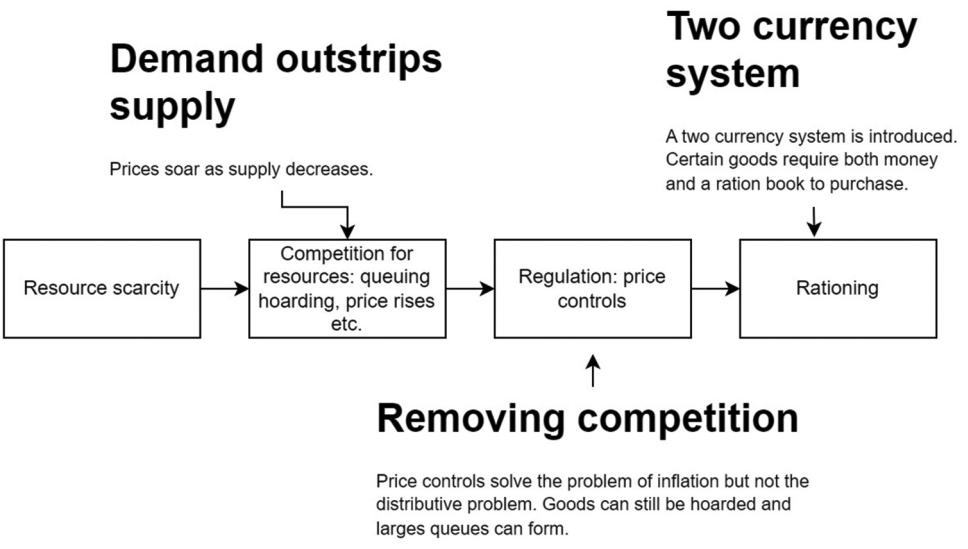

Figure 1. A flow diagram illustrating the process through which rationing was utilised during the Second World War to distribute scarce goods.

As a brief summary of how rationing worked, consider the following illustration (Figure 1) which illustrates how rationing helped to manage the distribution of goods in the UK during the Second World War.[12]

Finally, although we are presenting rationing as the paradigm example of the egalitarian conception of rationing (ECR) – discussed more in section 3 – this does not mean that wartime rationing was committed to a strictly equal share of resources. For example, pregnant women received additional rations to meet their nutritional needs (IWM, n.d.) and vegetarians received a *different* set of rations, without meat, but with 'extra cheese and eggs and milk and very occasionally, dried bananas, figs and apricots' (BBC, n.d.-b). Similarly, petrol was rationed to take need into account, at least to some degree:

> For a small 10HP vehicle this was issued on a basis of 5 gallons per month, maybe 6 gallons for larger cars. Anyone who used a car for business or professional purposes had then to apply for a 'supplementary' ration which was allocated according to need. (BBC, n.d.-a)

Departures from a strictly equal distribution of resources will be discussed further in section 3.

2.4. Rationing and Climate Change

Clearly, however, there are differences between a war and a climate crisis. This is a point that we will return to, at various points in this paper. And, related to this, readers are likely to ask, if rationing was introduced as a response to climate change, what would this look like? To develop a fully worked out policy, ready for implementation, would be a substantial task, and one that would require an approach and focus that would not fit

with the aims of this paper. However, two possible approaches will be presented – in broad terms – in section 4.

In section 2.3, we stated that 'it is important to emphasize the difference between rationing itself and the *scarcity* that rationing was a response to'. As such, a skeptic might challenge our arguments, arguing, 'the evidence from the two world wars might show that people are willing to accept rationing, when this was a response to scarcity, but they will not accept rationing when there is an abundance of resources available'. This will be discussed further in section 4, but here we will highlight two potential answers to this question.

First, we could argue that anyone who believes that rationing would *not* be a response to scarcity demonstrates that they do not understand the problem. There is a scarcity of carbon sinks. Given this scarcity, and the planet's limited ability to absorb GHG emission, we simply cannot use all the resources we have – we cannot burn our existing fossil fuel reserves – if we want to avoid catastrophic climate change (IEA, 2012). More generally, consider the evidence – highlighted in section 2.2 – that no country meets the basic needs of its citizens at a globally sustainable level.

In short, representing rationing-as-a-policy-to-mitigate-climate-change as rationing-in-the-face-of-abundance would be a mistake. We cannot continue to burn fossil fuels as we are currently, without harming future generations, and the young. In this sense, the scarcity is very real.

Nevertheless, it could be a legitimate worry that this scarcity is less obvious, and/or less immediate, than the scarcity experienced in wartime. In addition, as well as the fact that the scarcity (of carbon sinks) might be less obvious or less immediate, it would also be the case that the relation between scarcity and rationing would be different. In particular, on either of the approaches that we will explore in section 4, 'rationing would likely involve the rationing of some particular goods even though there is not a scarcity of those particular goods'.[13] As such, there would be an option available to us, which would not have been available to those who implemented rationing as a response to scarcity in war time. That is, in the case of rationing in the context of climate change, there will always be the option – and the temptation – to relax the restrictions, to reduce the level of scarcity. As such, we must acknowledge that there is a disanalogy here, which is likely to make rationing less popular than it was during the two world wars.

Similarly, it is important to acknowledge that, when we compare rationing with, for example, a carbon tax, in this context, it is not rationing alone that is being compared to a carbon tax. Rather, the more appropriate comparison is between a carbon tax on the one hand and rationing *plus* some package of regulations or restrictions[14] on the other hand. There are a few things we can say here. Rationing in this context may require a public information campaign to help people to *recognize* the scarcity of carbon sinks, to make it clear that we would *not* be introducing rationing-in-the-face-of-abundance. Second, this may also need to be supported by moral argument – highlighting the moral imperative to consider future generations or *at least* the current younger generations. This point, however, raises a more general point. If people are not sufficiently motivated to accept policies which are designed to mitigate climate change this isn't uniquely a problem for rationing. This will also be a problem for any tax-based solutions or indeed any solutions that will require sacrifices or changes of lifestyle. For example, if we compare rationing with tax-based solutions we would need to compare rationing with

tax-based policies that were similarly radical and therefore *similarly effective* at reducing emissions. Comparing the palatability of rationing with a *modest* carbon tax which would do little to reduce emissions would not be a useful comparison. (Also see section 5.2.)

Alternatively there is another approach that we could consider. This approach would still rely on a public that was willing – or could be persuaded – to support their government's efforts to mitigate climate change. But this may be easier to sell to the public if the public does remain resistant to the idea of rationing in the face of an *apparent* abundance of resources.

On this approach rationing would not be the first step in combating climate change. Rather we would start with various forms of regulation. Rationing would then be a policy to help *manage* the expected repercussions.

The International Energy Agency stated in 2012 that 'no more than one third of proven reserves of fossil fuels can be consumed prior to 2050 if the world is to achieve the 2 °C goal' (IEA, 2012). And a Carbon Tracker report from 2022 suggests that 'producing and combusting the world's reserves would yield over 3.5 trillion tons of greenhouse gas emissions, over seven times the remaining carbon budget for 1.5C' (Carbontracker.org, 2022). More generally, the public does understand that fossil fuels are at the heart of the problem and there is an increasing awareness of the significance of GHG emissions related to food production. Therefore governments could impose stricter regulations on carbon-intensive farming methods, close down coal mines, and prohibit any additional oil exploration. The sale of fossil fuels could be restricted such that companies could only sell certain amounts, for certain purposes and, for countries which rely heavily on the importing of fossil fuels, imports of fossil fuels could be banned or restricted. As Daniel Aldana Cohen emphasizes, 'We're only doomed if we change nothing. The 2018 IPCC report makes it clear that if we make the political choice of bankrupting the fossil-fuel industry and sharing the burden of transition fairly most humans can live in a world better than the one we have now' (D. Cohen, 2018).

Given that these policies would result in scarcity, this might still be hard to sell. But given the increasing recognition of the problem and the clear link between fossil-fuels and climate change the message would be simpler and from that point of view the message to the public might be easier to sell: to avoid inflicting serious harms on future generations – and on many who are alive today – we must drastically reduce the amount of fossil fuels we burn. Given the consensus among climate scientists (Lynas et al., 2021; Oreskes, 2004; Powell, 2017) this is a conclusion that is hard to argue against.

Rationing would then be the second stage of this approach. While regulation created the scarcity, rationing would *manage* the scarcity – and, as we have argued, rationing has *proved* its effectiveness in managing scarcity. On this approach, rationing would be similar to World War II rationing in that rationing would again be a direct response to a clear and immediate scarcity of resources.

That said, even on this approach, we would have to acknowledge that there is a disanalogy with World War II as highlighted above because we would always have the temptation to reduce the scarcity by relaxing restrictions. However, while this point should be acknowledged, it does not undermine our argument. Carbon taxes, for example, will have a similar problem: any time a carbon tax looks like it will be unpopular it will be tempting to reduce taxes to make it more palatable but potentially also undermining the aims of the carbon tax.

3. Preserving an Egalitarian Conception of Rationing

3.1. Rationing and Personal Carbon Trading

Several proposals to mitigate climate change are often likened to rationing or even considered rationing, but, as we will illustrate, they subscribe to a 'broad' conception of rationing. One set of proposals that comes relatively close to resembling Second World War–style rationing are commonly referred to as personal carbon trading (PCT) schemes. This term can be used to refer to any scheme which distributes limited tradable allowances of goods which embody emissions and/or emission rights to households or citizens.

Although multiple PCT proposals exist, most can be described as downstream cap-and-trade policies where limited tradable allowances are distributed for free on a per capita or household level (Table 1) (Fawcett & Parag, 2010). Allowances enable citizens or households to engage in emitting activities. For example, Niemeier et al. (2008) propose a policy of Household carbon Trading which focus solely on energy used within the household, whereas Tradable Energy Quotas (TEQs) focus on both energy and fuel (Fleming & Chamberlin, 2011). Allowances are derived from an overall state-wide cap or in line with certain policy goals and the quantity of allowances distributed would typically decrease over time as citizens and households adjust to lower-carbon lifestyles (Fawcett & Parag, 2010). Citizens who do not require their quota are able to sell them to other citizens who wish to consume resources beyond the level which their initial allocation enables.

Another benefit highlighted by advocates of PCT is that these schemes can facilitate wealth redistribution. Based on the assumption that higher-income households tend to emit more, lower-income households (with lower emissions) can sell their surplus permits upstream, which facilitates downstream wealth redistribution from higher-income household who require larger emission allowances to maintain their level of emissions (Fawcett, 2012; Starkey, 2012).[15]

These schemes garnered some support in the late 2000s including from the House of Commons Environmental Audit Committee (EAC, 2008). Two schemes in particular, Personal Carbon Allowances (PCA) and Tradable Energy Quotas (TEQs), have received significant attention and work within the UK (Fawcett, 2010; Fleming & Chamberlin, 2011).

Table 1. Proposed personal carbon trading schemes and allocation covering sectors and emission sources. List expanded and adapted from Fawcett and Parag (2010).

Proposal	Authors	Allowance	Type	Distribution
Cap and Share	Darrell (2008)	Pollution Authorisation permits	Trading	EPCA (Equal per capita allocations)
Tradable Consumption Quotas	Ayres (1997)	Tradable Consumption Quotas	Trading	EPCA
Personal carbon Allowances	Hillman et al. (2008)	Emission Allowance	Trading	EPCA
Tradable Energy Quotas	Fleming and Chamberlin (2011)	Tradable Energy Quotas	Trading	40% of budget EPCA 60% tendered to industry.
Household Carbon Trading	Niemeier et al. (2008)	GHG Allowances	Trading	Equal per household allocation (EPHA) with adjustments based on baseline household services.
Tradable Transport Carbon Permits	Raux and Marlot (2005)	Tradable Transport Carbon Permits	Trading	Allocation based on certain needs.
End-User Emissions Trading	Roy and Woerdman (2012)	Emission Allowance	Trading	Initial EPCA with modified distribution system to correct for allowances surplus/deficits.

However we will argue that we should not refer to these schemes as forms of rationing. Drawing on the work of Hugh Upton, we will argue that the term 'rationing' should be reserved for a narrower set of policies. PCT schemes such as PCA and TEQs have features that make them relevantly different from the rationing we defend in this paper.

3.2. Why Distinctions Count

Despite the differences between mainstream PCT proposals and Second World War–style rationing, authors of PCT literature often *liken* their proposals to a form of rationing or explicitly refer to their proposals *as* rationing. Ultimately different authors seem to understand 'rationing' in a number of different ways. Some use the term narrowly, essentially referring to the form of rationing typically associated with the Second World War (with a ration book and with a prohibition against trading). At the other extreme, some have an extremely broad sense of rationing essentially referring to *any* form of resource distribution.

M. J. Cohen (2011) argues that personal carbon allowances, tradable energy quotas, domestic tradable quotas, carbon entitlements and tradable pollution allowances are best viewed as variants of wartime rationing. And the authors of Tradable Energy Quotas (TEQs), arguably the most developed PCT scheme, also use the term liberally:

> TEQs are a very simple idea: an electronic rationing system with most transactions automated. (Fleming, 2005, p. 2)

Raux and Marlot (2005, pp. 261–262), proponents of Tradable Transport Permits, utilize the term *even more* broadly stating:

> If we consider the development of more stringent objectives of emissions reduction in the future, fuel rationing seems unavoidable: this rationing can basically take the form of either price (tax) rationing or quantities (permits) rationing.

Based on the above it appears that, within the PCT and climate policy literature, 'rationing' has come not only to refer to the distribution of limited tradable emission allowances but in some cases even taxation. On this broad understanding of rationing, taxation, PCT and other forms of market instruments seem to count as rationing. In fact, even laissez-faire economics can be considered a form of rationing because prices will rise because of greater demand for scarce resources such that these resources can be said to be rationed by price. Similarly, in addition to the more common forms of rationing, Stan Cox refers to rationing 'by price', 'by queuing', 'by lottery', or 'by triage' (Cox, 2013).

In this case, however, Cox uses this very broad concept of rationing for rhetorical effect, making an important point: if we have scarce resources we need to distribute them *one way or another*. We can distribute goods in a way that ensures that everyone's basic needs are met or we can ration by price which 'could create intolerable hardship for many' (Cox, 2013, p. 12). Cox's point, therefore, is that rationing by price is *just as much in need of justification as other forms of rationing*:

> The manner in which we share the burden of scarcity is something that arises from conscious choices. Resources don't decide for themselves where to go. (Cox, 2013, p. 12)

When used for rhetorical effect there is a clear rationale for deliberately adopting a broad concept of rationing as Cox does. However, we should also acknowledge that the majority of authors who adopt a broad conception of rationing do not do so with the same intention, and our aim here is to highlight an important problem with the broad conception of rationing. The use of rationing as an umbrella term for numerous and distinct policies can create barriers that prevent us from *distinguishing* an egalitarian conception of rationing from other forms of distribution. In particular, the use of the broad conception of rationing obscures a key distinguishing feature of Second World War rationing. Namely the rejection of markets through the prevention of tradable allowances.

Upton (2011) discusses similar issues in the context of resource distribution in healthcare. He presents numerous cases in which the term 'rationing' is used to describe varying means of distribution including through markets queuing triage and lottery. Upton labels this a 'broad conception of rationing' (BCR). Upton (2011, p. 406) argues that this conception refers to 'nothing more than what has traditionally been discussed under "resource allocation" or "distributive justice"'. And furthermore, he argues, including every means of distributing health services within this conception *conceals* a significant distinction between policies:

> The problem is not just that BCR includes both and thus fails to distinguish them. It is that by coming to be adopted as our idea of rationing, it will thereby supplant the very concept that most naturally captures the distinction: the much narrower egalitarian conception of rationing (hereafter ECR) familiar above all from the practice of rationing in wartime. (Upton, 2011, p. 406)

Upton suggests that overlooking an egalitarian conception of rationing (ECR) has *concealed* a debate in healthcare that being what constitutes a fair distribution of public healthcare resources. Key to Upton's ECR is the fact that it *does not prioritize some over others*. This facet can be easily concealed once the term 'rationing' is used broadly to include modes of distribution such as markets and prioritization. Markets prioritize those who command greater wealth. Economists often put this in terms of the greatest willingness to pay, but of course this phrase obscures the fact that one's willingness to pay often depends primarily on one's *ability* to pay. Prioritization, as the word suggests, gives priority to some rather than others such that *some groups are made better off than others* (Upton, 2011).[16] ECR rejects these modes of distribution, instead aiming to abandon no one and seeking equality at a useful level proposing a basic minimum for all (Upton, 2011).

However, as we highlighted in the discussion of wartime rationing, ECR need not be committed to a strict equality of resources regardless of people's different needs. Rather, Upton's suggestion is that we provide equal resources for equal needs.

Where there is any variation in a straightforward allocation of equal calories for all, the appropriate form of justification is one that refers to more complex considerations of equality. This might involve the unequal needs that result from differences between persons, such as being very young or being involved in heavy labor, where these can be seen as falling directly under a principle of equality: that of supplying equal calories for equal needs (Upton, 2011, p. 407).

Whether allocating resources strictly equally or allowing different rations for those with different needs, wartime rationing reduced the prioritizing effects of markets by rejecting

markets. (Reduced rather than eliminated because not all goods were rationed.) But rationing is not the only policy that rejects (or limits the role of) markets.

To many, this rejection of markets may seem alien and radical. With this in mind it is worth emphasizing that the idea is more familiar than we may first realize and the idea is often embraced. Michael Sandel gives other examples of things 'money can't buy' where policies aim *not* to prioritize the wealthy. For example the wealthy cannot avoid jury service by paying someone else to take their place (Sandel, 2012).[17] Similarly, if you have been selected to receive a vaccination against COVID-19 but your friend has not, you cannot sell your vaccination to your friend. If there is competition for places in the local state school and your child is given a place, you cannot decide that you would like the money more than the school place and sell it to another parent who wants it for their child. This is similar to the point that Ha-Joon Chang makes about the so-called free market and our blindness to regulation: 'A market looks free only because we so unconditionally accept its underlying restrictions that we fail to see them' (Chang, 2012, p. 1). We highlight these examples to emphasize the point that we should be cautious about rejecting ECR simply on the basis that is not compatible with a (fully) free market.

From this point on we will use the term 'rationing' to refer to ECR and particularly non-tradable rationing similar to Second World War rationing unless explicitly stated otherwise.

3.3. Rationing and Non-Tradable Allowances

Although the carbon allowance schemes discussed above all incorporate some form of trading, it is feasible that allowance-based schemes could exist with *non-tradable* allowances.[18] For example governments could limit the number of long-haul flights an individual could make in a year or they could limit the amount of petrol one can buy in a month. Though seemingly unpalatable, these policies could be adopted, and policies like these have been adopted in the past century, for example when food and petrol and other goods were rationed in the two world wars. Few robust proposals exist regarding the rationing of personal carbon emissions in this manner. However, as mentioned, Roodhouse (2007) argues for Second World War–style rationing schemes as a means of reducing emissions. Some features of these proposals could lead to policies that resemble PCT schemes as they both seek to limit and distribute access to emitting activities and they may well utilize the same technologies. Yet key distinctions exist between them such that the (non-tradable) rationing of personal emissions should be considered a unique and separate policy with its own set of unique benefits (and costs).

Upton's work helps us recognize a distinction between PCT and the ECR. ECR aims to distribute resources equally – or according to 'more complex considerations of equality' (Upton, 2011). In contrast, through the creation of markets, PCT's mode of distribution prioritizes those who have greater expendable incomes over those with less. Second World War–style rationing did not prioritize the wealthy. It sought to provide a basic minimum for all. Indeed, as we saw in section 2.2, this seems to have been a key part of its success.

The use of 'rationing' as a term to describe personal carbon trading schemes therefore obscures and draws attention *away from* the significant differences between PCT and ECR.

By highlighting the differences, our aim is to stimulate debate over the distributive issues that might otherwise be overlooked when formulating climate mitigation policy.

3.4. A Thoughtful Proposal for Rationing Without Tradability

In an interview with Stan Cox, Tina Fawcett claims 'never to have seen a thoughtful proposal for making a carbon-rationing system work without tradability' (Cox, 2013). Later we suggest that this claim over-emphasizes the difference between the present and the past. If we don't see these contexts as radically different then we can argue that, not only is there a thoughtful proposal, it has been tested and it proved to be effective, popular, and fair.

Similarly Cox states that:

> To Fawcett, criticism of tradability seems to be 'more of a reaction people have' than a serious counter-proposal. (Cox, 2013, p. 106)

This seems to suggest that it is *just* a reaction rather than a considered position that could be supported by rational argument. This is unduly dismissive not only of the moral intuitions of the general public but also of the philosophical arguments of Michael Sandel and Hugh Upton (among others) *and* of the lessons we can learn from history.

In the remaining sections of this paper, we will argue that a preference for non-tradable rationing can be based on a solid foundation of moral argument, economics, and evidence of effectiveness and fairness.

3.5. PCT and Fairness

Finally, in this comparison between PCT and the egalitarian conception of rationing, we must acknowledge that defenders of PCT would argue that PCT can also be defended in terms of fairness (because of the redistribution of wealth via the trading of carbon allowances). We do not deny this, at least if PCT is being compared with tax-based solutions. Ultimately, however, we suggest that rationing still has distinct advantages in terms of fairness and potentially also in terms of public support. While PCT is likely to be fairer than tax-based solutions, the fact remains that PCT is still a policy that gives priority to the wealthy, allowing them to consume more and *do* more than the poor. In contrast, rationing aims to distribute goods and burdens (more) equally regardless of wealth. As discussed in section 2.3, this was a key part of its popularity.

4. Rationing as Climate Change Mitigation

4.1. What Form of Rationing?

As mentioned in section 2.4, one option for mitigating climate change would be to impose various restrictions and regulations, effectively limiting the supply of fossil fuels (and potentially other resources). While helping to reduce emissions, this would also result in a scarcity of various goods (potentially including many essential goods). Rationing (along with price fixing)[19] would then be introduced to manage the obvious and immediate[20] scarcity that would result.

One way to manage this scarcity would be to use forms of rationing very similar to the wartime rationing discussed in section 2.3. Indeed, many of the things that were rationed in wartime are – coincidentally – things that one might want to ration in response to climate change. For example, in Britain, two key items that were rationed were petrol and food. As a fossil fuel, the significance of petrol is obvious, and in recent years there has been greater recognition of the significance of GHG emissions coming from food – meat in particular (Cox, 2013; Hedenus et al., 2014; Mcmichael et al., 2007; Scarborough et al., 2014; Springmann et al., 2017). Similarly, clothing was rationed during the Second World War, and there is also an increasing awareness of the environmental impacts of 'fast fashion'. And although it wasn't implemented, the government did also consider rationing household energy and a detailed plan of how to do this was developed (Freear, 2015). And of course other goods could be rationed if deemed appropriate. Aviation, for example, could be rationed whether by number of flights a year or by air miles.

Therefore, in addition to stricter regulations on fossil fuels, regulation could also target other areas. For example carbon-intensive farming methods and factory-farmed livestock could be banned – which would clearly have impacts on food supplies.

As this approach focuses on specific goods (rather than allocating overall carbon allowances), this policy is unlikely to be implemented in isolation. For example, a tax-based approach could be used to reduce general consumption while specific targeted rations could be used (1) to *rapidly* reduce consumption of specific goods that are particularly problematic (e.g. petrol) and/or (2) to ensure that essential goods (e.g. particular foods) are available to all and distributed more equally than would be possible if rationed by price.

However, some may argue that rationing has evolved significantly since the two world wars and therefore, rather than considering forms of rationing that are remarkably similar to the rationing of the 1940s, we should want something more modern and more sophisticated, more like the carbon allowance schemes discussed in section 3 (see for example Sodha, 2019). We have no objection to the modernization of rationing with carbon cards (like bank cards) to keep track of your carbon allowance rather than ration cards. We also have no fundamental opposition to a more generalized carbon allowance applying to all (or a large range of) goods, rather than individualized rations for specific goods. However, as we argued in section 3, if a scheme prioritized the wealthy by allowing them to buy additional allowances we would not want to call that scheme rationing. And, regardless of what we call it, we would argue that we should not automatically assume that the best carbon allowance scheme would be one that involves trading. The possibility of a personal carbon allowance scheme *without* trading deserves to be taken seriously.

Our aim here is not to develop such a scheme and neither is our aim to defend the modern approach over the more traditional approach (or vice versa). As we suggested earlier in the paper, our aim is more modest: to highlight the underappreciated virtues and the specific egalitarian nature of rationing, to argue that it deserves to be taken seriously and hopefully to spark further debate – and perhaps to inspire others to develop a modern and sophisticated form of rationing which nevertheless maintains the egalitarian spirit of ECR.

In the next section, however, we will reflect on one key difference between the two approaches.

4.2. Distinct Stages or a Sophisticated Cycle?

As we have noted there is a wealth of PCT proposals (developed to varying extents and focusing on a variety of carbon intensive goods) to draw from and adapt. With this in mind there is one feature of the modern carbon allowance schemes that is worth highlighting. In contrast to the traditional approach highlighted above, modern carbon allowance schemes do not typically separate the policy into two stages. That is, they do not first use regulation to reduce emissions and then – as a distinct second stage – introduce rationing to manage the resulting scarcity.

For example, consider Fleming and Chamberlin's Tradable Energy Quotas scheme (see Fleming & Chamberlin, 2011). The TEQs scheme is arguably the most extensively and well-developed PCT proposal having been subject to a full pre-feasibility study by the UK government (DEFRA, 2008). Although it was initially labeled a project 'ahead of its time' (DEFRA, 2008, p. 4 & 21), discussions on the scheme have recently reemerged in academic discourse (Alexander & Floyd, 2020; Fuso Nerini et al., 2021).

Within the TEQs scheme the UK's committee on Climate Change sets an annual carbon budget which is distributed via a Registrar – 40% of this budget is distributed directly to individual adults on a weekly basis; the remaining 60% is sold by tender to all non-household energy-users in the economy. From then both households and non-household energy users pay for energy with both money and a portion of their energy quota. TEQs are then passed upstream from energy providers to wholesalers and finally to primary providers. Primary providers then return these TEQs to the Registrar when extracting or importing fuel. Each year the Registrar issues fewer TEQs in line with the decreasing carbon budget, thereby decreasing national emissions. Further flexibility for households is enabled by initially providing each household with a year's supply of quotas which is then topped up on a rolling weekly basis.

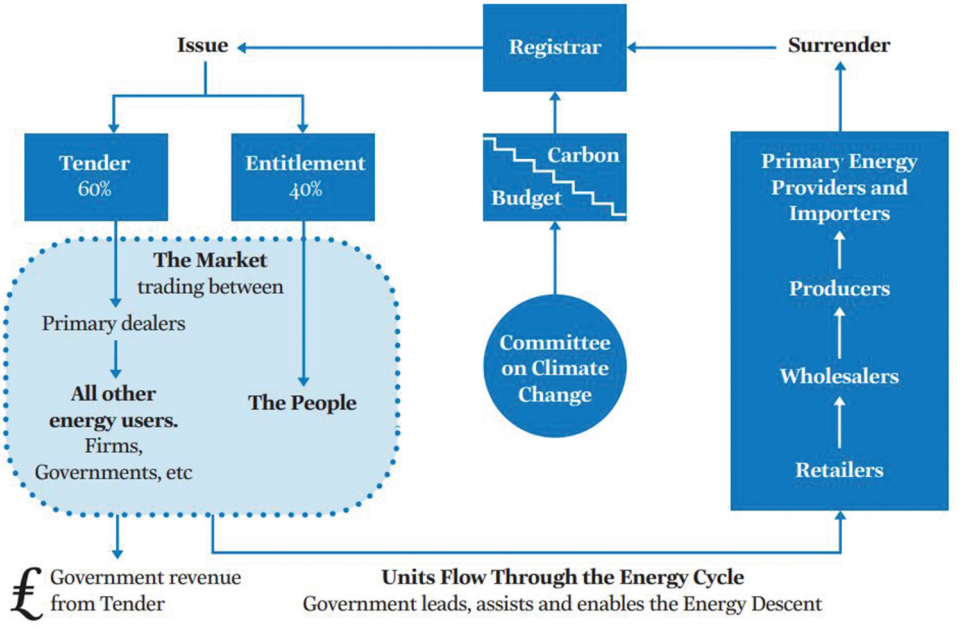

Figure 2. How the Tradable Energy Quotas would cycle through an economy completing a loop of consumption through to production of fossil fuels. Fleming and Chamberlin (2011, p. 13).

As Figure 2 highlights, this approach does not make use of distinct stages. Rather, there is a sophisticated cycle which is not easily reduced to two distinct stages. However, as we discussed in section 2.4, there is a concern that this approach could be perceived as a policy of introducing rationing despite an abundance of resources. Section 2.4 presented some ways in which we could try to win public support for such an approach. At the same time though section 2.4 also suggested that there might be a virtue in the simplicity of the two-stage approach and that this might make it an easier sell.

4.3. Isn't It Irrational to Have a Prohibition on Trading Allowances?

On either account though the approach we are defending here would be one that doesn't allow individuals to sell their rations (or their 'allowance'). We recognize that many readers will challenge us here, asking why non-tradable rations would be better than a scheme with trading. Similarly, economists typically suggest that if you prevent trade between two people you make both individuals worse off (Mankiw, 2020). Therefore, in line with the common assumption in mainstream economics that the ability to trade is beneficial (See Brakman et al., 2001; Mankiw, 2020), some may ask: why would anyone want to be deprived of the opportunity to trade?

Essentially the reason for restricting trade is the reason highlighted in section 3. That is, it ensures that the burden is shared more equally preventing the rich from simply buying the right to pollute (as Sandel puts it). However, this shouldn't be seen as leveling down. We wouldn't simply be removing benefits from the rich for the sake of it, to bring them down. Rather, in the context of rationing, removing the option to trade can be beneficial to the less well off.

Here it is important to avoid fetishizing money. Money is only valuable if it allows you to buy resources. As such, we should not focus on the question of whether a policy of tradable carbon allowances would allow people to earn extra money by selling surplus allowances. We should focus on what goods individuals would actually be able to obtain.

People often talk about the benefits of allowing people to sell the rations they don't need to those who need more (Thumim & White, 2008). For example, if you only have a small home and so don't need to use much of your allowance to heat your home you can sell any surplus allowance to others who may have larger homes to heat (although see 4.3.1 on the socio-material determinants of energy vulnerability). But – if we are talking about a general carbon allowance for a large range of goods (rather than specifically energy to heat your home) – the poor do not generally have fewer needs (or fewer desires) than the rich. As such, we should state things clearly. The surplus carbon allowances will (in most cases) be 'surplus' because they have run out of money: they do not have enough money to purchase more goods.

Schemes with *tradable* carbon allowances prioritize the rich and essentially guarantee that the rich can consume more than the poor and that the poor therefore carry the greater share of the burden of our efforts to reduce emissions. In contrast, ECR combined with price controls (at least on certain goods) ensures a more egalitarian distribution of goods ensuring that even the poor will be able to afford to actually use their allowance. In short, ECR is not levelling down. It does not aim to

prevent the rich from being able to obtain more resources than others just for the sake of making the rich worse off (compared to alternative schemes). Rather, it aims to distribute resources more equally, allowing the less well-off to purchase a larger share of the pie.

4.3.1. The Importance of Price Controls

Here it is important to emphasize two points about rationing as it was used in the two world wars. First, it wasn't just that goods were rationed and that the selling of one's rations was prohibited. In addition to rations which could not be sold, *price controls* ensured that prices were kept low (despite demand exceeding supply). Second, it was essentially a system involving dual currencies as highlighted in section 2.2 in Figure 1. To purchase anything you needed *both* the money *and* the ration. These are important details that have significant implications particularly for comparisons between rationing schemes and PCT schemes.

Rationing schemes and PCT schemes are *both* approaches which rely on two currencies. If you want to buy something you need money and you need a ration slip or a carbon allowance. That is where they are similar. But where they differ *hugely* is in their emphasis on financial wealth. In PCT schemes, money remains hugely important. In Upton's terms, PCT schemes prioritize the wealthy. The wealthy can buy the right to pollute and can avoid the burden of having to reduce their carbon footprint. In contrast, rationing schemes aim to *minimize* the influence of money. As noted above, rationing was combined with price controls to keep prices low (blocking the usual effects of supply and demand) to keep key resources affordable for the majority of people, including the poor. As such, money becomes much less important. And, as a result, the poor are likely to be able to consume more (and particularly to have better access to *essential* items) than they would under PCT schemes which put much more significance on an individual's personal wealth. At its most extreme, if prices are kept low enough (e.g. imagine your weekly ration of petrol cost 1p), money becomes pretty much *irrelevant,* at least in relation to those goods that are rationed. As such, rationing is clearly beneficial to those with the least money.

More generally the idea behind the suggestion that people will be better off if they are allowed to trade is based on the idea that more choice is better than less. If you want to trade you can. If you don't want to, you don't have to. But there are numerous problems with this line of argument. First, it is based on the dubious assumption that humans can be characterised as *homo economicus* (see Thaler & Sunstein, 2008 pp. 6–8). Second, it simply is not true that more choice is always better than less (Dworkin, 1982; Iyengar, 2010). Third, it ignores the importance of context and particularly the importance of relational goods (Frank, 2012). Earlier we suggested that some may ask: why would anyone want to be deprived of the opportunity to trade? But Frank would suggest that this could be misleading. In many cases, the relevant question is, why would you like *others* to be deprived of certain choices. Frank discusses this in detail throughout *The Darwin Economy,* and this point is particularly important if some key goods remain outside of the rationing and price controls – the implications for house prices, for example, would be particularly significant. (See Frank's discussion of house prices and schools in chapters 1 to 3.) Fourth, there are moral arguments that suggest that it is sometimes appropriate to distribute certain goods or burdens by criteria other than willingness/

ability to pay (Sandel, 2012).[21] But perhaps most importantly, framing it in terms of more choice being better than less is hugely misleading. A PCT scheme is not a scheme that gives you all of the choices that a rationing scheme does, plus an additional choice: the choice to sell part of your allowance. Rather, rationing schemes – or more accurately the price controls that accompany rationing – give you an option you simply will not have under other policies: the option to buy goods at a price which is not determined by the market, and which is significantly cheaper than it would be if left to the market.

It is important to bear in mind both that a household's or person's ability to achieve an adequate level of thermal comfort is also mediated by a range of social material and demographic factors such as quality of housing age disability and health (Ambrose, 2015; Boardman, 1991, 2013; Middlemiss & Gillard, 2015; Snell et al., 2015; Walker, 2008), all of which factor into a person's vulnerability to various forms of energy poverty (Middlemiss & Gillard, 2015). All meaning that a low-income person from a vulnerable demographic will be particular vulnerable to energy poverty.

Bolton et al. claim that in England 13% of households are fuel poor (Bolton et al., 2022) (and this figure has likely grown substantially throughout the energy crisis of 2022). This suggests that many households cannot currently afford to emit their 'fair share' of emissions. Furthermore the UK's wealthiest 10% are responsible for 27% of consumption emissions whilst the poorest 50% emit 28% (OXFAM, 2020). Whilst a core aim of rationing is to reduce overall emissions, it does not follow that the aim must be to reduce emissions for all individuals. For example, it seems feasible to incrementally reduce emissions overall whilst the lowest emitters and often worst off may be able to *increase* their emissions – not despite rationing but *because* of rationing (and price controls). This would be comparable to the fact that rates of malnutrition went down, not up, when food was rationed during the war (Cox, 2013, pp. 34–35). Also see section 5.4.

4.4. The Role of Rationing in a Pluralist Response to Climate Change

Finally, we should emphasize that we believe that rationing would be most plausible when considered as a policy that would be implemented as *part* of a broader pluralistic response to climate change.[22]

This largely reflects the approach taken in wartime rationing as not everything was rationed. So essentially the government was willing to allow an unequal distribution of certain goods: prices would rise due to supply and demand such that these items were essentially rationed by price.[23] But, for other goods, prices were fixed so the poor could afford them and rationing was introduced to ensure a fair share of key goods (see Figure 1).

No one single policy is going to be sufficient to combat climate change effectively *and* fairly, but rationing could play an important role in a pluralist response to climate change.

We want to emphasize again that the approaches presented above are only illustrative examples. Rationing could be implemented in many ways combining with other policies in different ways and indeed potentially combining different methods of rationing. For example, as suggested above, we might start with stricter regulations. But then, in managing the scarcity, we might use any number of mechanisms. We might, for example, use Second World War–style rationing to manage the scarcity of petrol and food (as in the

Second World War) but make use of Niemeier et al.'s policy of Household Carbon Trading for managing the supply of household energy (Niemeier et al., 2008) and a frequent flyer tax (with a 'ration' of one tax-free flight per year) to manage aviation (Chapman et al., 2021).

As such, there are many options and many combinations available. It is not our aim in this paper to defend any specific policy or combination of policies. Rather, our aim is more modest. We recognize that there are a number of options available, each with their own advantages and disadvantages. Our aim is simply to argue that rationing has advantages that are often overlooked and that rationing deserves serious consideration along with the other options available. In addition, in the following section, we will also argue that many of the objections to rationing are misguided or based on misconceptions.

5. Objections and Replies

The following sections provide responses to common objections to the idea of including rationing as a key part of a pluralistic response to climate change.

5.1. Black Markets

When we have presented this paper, a common challenge has been, 'rationing is fine in theory but it doesn't work in practice because there will always be a black market'. But this view is not supported by history. To clarify, we are not claiming that there was not a black market in the Second World War. There was, of course. Our claim, however, is that this did *not* undermine the effectiveness of rationing. As noted in section 2.3, rationing was successful.

Regarding the black market specifically, Cairncross stated that 'it is generally agreed that black markets were relatively unimportant in Britain during and after the war' (Cairncross, 2013, p. 351), and Mark Roodhouse argues that the black market was 'socially significant yet economically unimportant' in the sense that it allowed some flexibility for people to obtain rationed goods illicitly but was not widespread enough to undermine the effectiveness of rationing (Roodhouse, 2013).[24]

5.2. The Temporary Nature of Second World War Rationing Compared to Climate Change

Some argue that rationing was a viable option during the war because it was recognized that it would be temporary but the situation would be very different if rationing was proposed as a long-term (or even permanent) policy. Therefore, according to this argument, any lessons we learn from history will not be applicable when considering climate change. For example, Naomi Oreskes argued:

> Climate change will become the new normal. Therefore, whatever mechanism is used to address it must be normal, too. The most likely mechanism that fits that bill is a carbon tax. Whatever you say about taxes, no one can deny that they are normal. (Oreskes, 2011, p. 226)

We have two responses to this line of argument.

5.2.1. Rationing Could Be Temporary

First, we should not dismiss the possibility that rationing could be temporary in a climate change context. Many people, particularly economists, are optimistic about our ability to adapt and develop new technology (Nordhaus, 1993).[25] On this optimistic view, rationing could help us to manage (and could also accelerate) the transition from fossil fuels to cleaner energy.

5.2.2. What is So Good About Permanent Unfairness?

Even if the end would not be in sight, or rationing would not be temporary, why should this count against rationing? Tax isn't a sacrifice-free alternative and neither is PCT. If tax is to be as effective as rationing it must reduce consumption to the same degree. So sacrifices will still be required. The sacrifice is just distributed differently – less fairly.

To see how odd this argument is, it is worth emphasizing the extent to which this objection fails to recognize the arguments that have been made in favor of rationing. Remember the claim is that rationing is *fairer and more effective* than alternatives. Given that this is the argument, it is an odd response to say, 'That's fine as long as it is temporary. But if it is going to be permanent then we prefer the solutions that will be *less* fair and *less* effective'.

Of course, it *would* make a difference if being permanent changed the way that different policies would work. However this seems to count *against* tax-based solutions and in favor of rationing.

Keynes and Hayek recognized that there were concerns about the fairness of tax-based solutions, given that it would not be sufficient to tax the rich. For example, according to Bruce Caldwell, Keynes recognized that, if this was to be effective, the 'tax would have to be extended to the working classes' because

> a tax on the rich would not sufficiently reduce expenditure, so it would not help with the problem of excess demand for consumption goods. (Caldwell & Caldwell, 1997 p. 34)

Caldwell states that Keynes tried to 'soften this unpopular but inevitable truth' with the 'novel idea of "deferred pay" or "compulsory savings" provision' (Caldwell & Caldwell, 1997). Instead of taking money away from people permanently, in taxation, money would be taken from people but put into savings that they would only be able to access after the war. This ingenious idea would limit people's ability to consume but would not permanently deprive anyone of their money. In the case of climate change, however, it would not be clear when – if ever – we would be able to return people's savings. But if this is what is necessary to make Keynes' solution palatable, it should be clear that it is the tax-based solution, and not rationing, that becomes less attractive if a permanent solution is needed.

In addition, much more recent history has highlighted the difficulties that may come from an over-reliance on tax-based solutions. The suggestion that people will be more likely to accept taxes just because people are used to being taxed[26] ignores the significance of differences in degree. It also ignores difference between progressive taxes and regressive taxes and people's ability to recognize the difference and their willingness to oppose unfairness. But, as Keynes and Hayek recognized, to reduce consumption significantly we would have to tax the poor as well as the rich. And, as French president Emmanuel Macron learnt in 2018, an eco-tax that impacts on the poorest members of society may not be tolerated (Watts, 2018).

5.3. Climate Change the Second World War and the Significance of Inequality

Another objection emphasizes that we live in different times and therefore rationing would not be accepted today, especially given the significance of inequality. We suggest two possible responses to this.

5.3.1. Understanding History

First, we should not over-emphasize the differences. It is often tempting for non-historians to view history as a linear progression in a particular direction and therefore to see ourselves forever moving away from a particular past. This view of history could lead us to believe that we are heading in a direction of increased inequality and an ever-increasing commitment to free market ideology. On this view it is natural to insist that rationing is a thing of the past and would not be accepted now.

From a historical perspective this trajectory of increasing inequality is a recent development starting in the 1980s. In contrast, Richard Pomfret calls the twentieth century as a whole 'the Age of Equality' commenting that 'the extent of the safety net for those at the other end of the wealth distribution in high-income countries' is 'in striking contrast to a century earlier' (Pomfret, 2011, p. 217). Similarly 'before 1900 . . . [t]he slave trade was abolished, factory acts limited working hours and set rules on working conditions, and child labor was outlawed' (Pomfret, 2011, p. 217). And Figure 3 below, from Dorling (2012), shows the *reduction* of income inequality from 1920 to the 1970s, and this also highlights the fact that trends can be reversed.

Furthermore, changes in inequality are not a matter of luck. Contrasting the record of Blair's Labour with previous Labor and Liberal governments, Danny Dorling writes:

> In Britain, every previous Labor and 20th century Liberal administration presided over a period when inequalities in income, wealth and health fell overall during their periods of office. It would take a deep cynicism to believe that was coincidence. (Dorling, 2012, p. 66)

Finally, many are speculating about the impacts that the global COVID-19 pandemic will have long term on politics and economics (Tooze, 2020). This is of course speculation, but it is unlikely that it will leave politics unchanged. And, although rationing wasn't officially

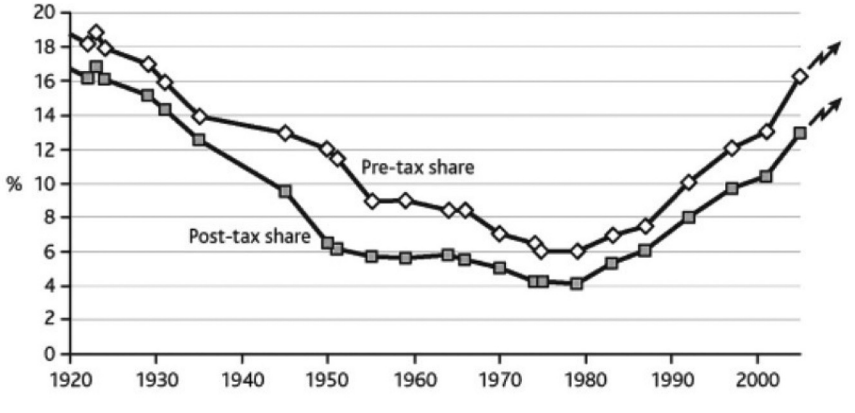

Figure 3. Graph showing share of income received by richest 1% in Britain from 1918 to 2005 taken from Dorling (2012).

introduced, most supermarkets introduced their own versions of rationing to manage demand in the panic buying that occurred prior to lockdown in 2020. Although this was not on a scale comparable to people's experience of rationing in World War I, it did give us all a small experience of rationing we would not otherwise have, and many will have understood that, without rationing, they may have failed to get the essentials they needed. As such, this might echo in a small way the situation described in section 2.2, where, at the beginning of World War II, people already had an understanding of how rationing could help us to avoid 'the maldistribution of foodstuffs' and 'food queues'.

Similarly Russia's invasion of the Ukraine has given some indication of what might happen if we used stricter regulation to limit the amount of fossil fuels we burn. In this case, the scarcity of fossil fuels was not the result of policies aiming to reduce emissions. Nevertheless, the similarities are significant, with people already (at the time of writing) seeing the impacts of a mismatch between supply and demand and with rationing being considered a potential solution. For example, the Institute for Fiscal Studies (IFS) has stated:

> Prices are high because Europe faces severe gas shortages in the coming months. To correct the (large) mismatch between supply and demand, some users of energy – whether households businesses or governments – will have to reduce their energy use. The less UK households reduce their energy demand, the greater demands placed on others. If other European countries also attempt to subsidize household or business use of energy, the result could be a bidding war that raises the cost of providing support in all countries. It also risks a situation where there is simply not enough energy to go round, which *would require rationing* or increase the risk of blackouts. (IFS, 2022) (emphasis added)

Indeed, 'Some European governments have enforced energy rationing since Russia began cutting gas supplies' (Elgot et al., 2022). And Britain is – at the time of writing – seriously considering a form of rationing as crude as 3-hour blackouts as a way to manage the scarcity of gas in Europe (Wootton-Cane, 2022).

5.3.2. A Moral Argument

Second, we should also challenge the (implicit) assumption that we must work with public opinion as it is. Many people opposed the abolition of slavery, votes for women, civil rights and racial equality. But these policies were right and fair, so people argued and fought for them.

Similarly in the Second World War the government didn't simply utilize *existing* support. It worked to gain support – to emphasize the benefits with posters stating:

'RATIONING MEANS A FAIR SHARE FOR ALL OF US'

In this poster the text was in the center of the page. Above the text there was a picture illustrating the inequality that would exist 'without rationing' and below was a picture showing the equality that was achievable 'with rationing'.[27] Similarly another poster reassured the public: 'RATIONING SAFEGUARDS YOUR SHARE'.[28]

5.4. Objection from Economics: Regulation and Rationing Are Blunt Instruments Best Avoided

Economists often suggest that regulation such as rationing is a blunt instrument that is crude and inefficient and unlikely to be as effective a tool as market mechanisms. However, the details are important here and economists typically qualify these

statements. For example, we take Hepburn (2006) to be a paradigm example of an economist's assessment of different types of intervention. And indeed many people appeal to Hepburn's analysis to support the claim that regulation by price is preferable to blunter instruments of regulation.

But people seem to forget that, early in the paper, Hepburn acknowledges the limitations of economic analysis:

> This paper focuses upon the choice of policy *instrument* to achieve a particular *target* . . . This paper does not address the question of appropriate policy objectives, nor the justification for government intervention. (Hepburn, 2006, p. 228)

If people want to appeal to Hepburn's analysis (or similar analyses by other economists) they must remember this important qualification and we must ask: What counts as *better*? What targets should we be aiming for? These are not questions that can be answered by a school of economics that aims to be objective and free of value judgments (see Chang, 2014, chapter 4).

To quote Dale Jamieson (from a different, but related, context):

> This dispute cannot be resolved by economic analysis alone . . . [Economists] are . . . up to their ears in ethics. (Jamieson, 2014, p. 6)[29]

Essentially, Jamieson's point is that (neo-classical) economists often fail to recognize that their basic assumptions 'pre-suppose normative stances' (Jamieson, 2014, p. 6) (also see Chang, 2014; Broome, 2008; Gardiner & Weisbach, 2016).

Economic theory is unlikely to support regulation by price if:

- the target you are aiming for is an egalitarian distribution of a particular resource
- you believe that a particular policy should not give priority to the wealthy
- you have a moral objection to the rich being allowed to buy a right to pollute
- you believe, as the British public did in 1941, that all classes and sections of society should have to endure equally and each carry a fair share of the society's burdens.

6. Conclusion

We have argued that an overly broad understanding of rationing has obscured the specific advantages of an *egalitarian* conception of rationing, and we have argued that rationing could play an important role in a pluralistic response to climate change.

As such we hope this paper will stimulate further debate about the role that rationing could play in climate change mitigation[30] and stimulate debate about the forms that rationing might take in the 21st century.

Notes

1. Also see (Roodhouse, 2015).
2. That said the evidence presented in section 2.2 also suggests that the need to reduce emissions is urgent enough that we may need to embrace policies which focus on individual consumer-level emissions in addition to any higher-level policies focusing on city planning or energy supply etc.

3. The National Archives (TNA) Cabinet Office Papers CAB 65/1/60 War Cabinet 60 (39) 'Cabinet Conclusion: Minutes and Papers' 25th October 1939 p. 505.
4. TNA Cabinet Office Papers CAB 65/1/60 War Cabinet 60 (39) Cabinet Conclusion: Minutes and Papers 25th October 1939 p. 505.
5. CAB 24/71/47 Ministry of Food Supplement to Weekly Report for week ending December 4th 1918 p. 2.
6. The National Archives INF 1/202 Home Intelligence Weekly Report no. 85 20th May 1942 p. 4. Our italics.
7. TNA INF 1/292 Home Intelligence Weekly Report no. 32 May 7th – 14th 1941 p.2.
8. For a discussion of Hayek's and Keynes' proposals see (Caldwell & Caldwell, 1997 pp. 32–36) Also see (Hayek, 1997).
9. Keynes' innovative solution to this problem will be discussed in section 5.
10. See (Chang, 2014, chapter 4).
11. Also see (Roodhouse, 2015) – listen from 13.25 to 21.30.
12. For more on the history and future of rationing see the recordings from the interdisciplinary workshop on The History and Future of Rationing https://ahc.leeds.ac.uk/ethics-research-innovation/dir-record/research-projects/990/climate-change-ethics-and-responsibility
13. We thank an anonymous reviewer for highlighting this point.
14. Or something potentially more sophisticated but essentially with the same aims. See section 4 for more details – particularly section 4.2.
15. Although this tends to be the case many low-income households are subject to fuel poverty and may not be able to make use of their permits to meet adequate levels of welfare. Further lower income households may sometimes have higher emission needs because of poor home and transport efficiencies e.g. an inefficient boiler or poorly insulated home – which require greater fuel consumption to heat and inefficient cars which require more fuel per mile.
16. Note that Upton's use of prioritization should not be confused with Prioritarianism in political philosophy. According to the latter we should give priority to the worst off. But crucially the aim there is not to identify a group who should then be made better off than everyone else. On the contrary, in many cases, they will remain worse off than others – but better off than they were. In contrast, the Prioritization that Upton is concerned about is the approach that identifies a group that is then privileged and made better off than others – e.g. the wealthy.
17. Sandel is clearly concerned that the list of things money can't buy is getting smaller and his book is primarily focused on examples of things you *can* buy but *shouldn't* be able to buy.
18. See work by Roodhouse (2007) and Cox (2013) on WWII rationing. Also see Alcott (2010).
19. See Figure 1 in section 2.3.
20. Here 'obvious and immediate' is intended to contrast with the potentially less apparent scarcity of carbon sinks.
21. (See sections 3.2 and 5.5 for examples.).
22. In addition, underlying inequalities and social deprivations that would render people vulnerable to current proposals may still require further redistributive and support measures to ensure these group's needs are met within this broader transition away from fossil fuels and the consumption of GHG intense resources.
23. Here we use this phrase for rhetorical effect. See the discussion of Cox in section 3.2.
24. Also see (Roodhouse, 2015) – listen from 15.30 – and M. J. Cohen (2011).
25. Also see Simon (1981). The ultimate resource. Princeton University Press.
26. See Oreskes (2011).
27. Office of Price Administration United States (1943) *Rationing means a fair share for all of us* [Poster]. [Accessed online at http://collections.vam.ac.uk/item/O106450/rationing-means-a-fair-share-poster-office-of-price/ on 25 October 2015].
28. Library of Congress United States (1942) *Rationing safeguards your share* [poster] <https://www.loc.gov/resource/fsa.8b02931/> [accessed 25 October 2015].
29. Jamieson was in fact discussing the dispute between Nordhaus and Stern, focusing on the issue of discount rates. However, we quote Jamieson because the general point that Jamieson highlights is relevant to economics more generally.

30. Indeed although this paper focuses on mitigation, rationing could also have a role to play in climate change adaptation. For example rationing could be used in response to the 'increased likelihood of under-nutrition resulting from diminished food production in poor regions (high confidence)' (IPCC, 2015, pp. 19–20). And more generally, given the egalitarian nature of rationing, rationing could be a natural response to the concern that 'Climate-change impacts are expected to exacerbate poverty in most developing countries and create new poverty pockets in countries with increasing inequality in both developed and developing countries'. (IPCC, 2015, p. 20).

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