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Green Political Theory in a Climate Changed World

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ABSTRACT

This paper evaluates some implications for green political theory of the international community's failure to avert dangerous warming. We identify an emerging conflict between the green-romantic value of restraint and green-rationalist value of protection, between a desire to preserve biotic systems and a distrust of scientific solutions to problems that are intrinsically social. These divisions risk undermining the environmental movement's influence. In response, we outline approaches that might express impulses toward preservation and restraint in a climate changed world. An ethic of restraint, encompassing non-domination and post-materialist values, can validly be justified without recourse to the threat of ecological catastrophe. Meanwhile, in respect of preservation, we argue that scalable emissions control measures and international cooperation are necessary to make future mitigation efforts politically viable and that this suggests the necessity of accelerated research into low-emissions energy technologies. However, incompatibility with environmental 'logics of practice' means technophilic preservationism must build political support outside the traditional environmental movement.

Keywords: Anthropocene, geoengineering, Enlightenment, climate policy, cooperation, breakthrough

1. Introduction

Current proposals for reforms to global climate governance bring to mind the apocryphal tale of the Irish farmer who, asked the quickest route to Dublin, replies, 'I wouldn't start from here'. Many have surveyed the terrain – the increasing global greenhouse gas (GHG) emissions, lagging domestic political support, geo-political tensions, dearth of scalable low-cost renewable energy technologies, developing world growth-patterns, the long life of existing energy infrastructure and slow pace of technological progress – and concluded that there is no plausible path by which dangerous warming might be averted. Timely climate stabilisation seems improbable given current trends. Some serious thinkers are demanding that we select a less demanding destination or an easier starting point. 'Eco-modernists' and other 'pragmatists' are calling for intensive research into breakthrough energy technologies and geoengineering stop-gap measures as supplements to multilateral efforts to reduce greenhouse gas (GHG) emissions (Shellenberger and Nordhaus 2007; Victor 2011; Arias-Maldonado 2013). In the Irish story the farmer who imagines that an arduous journey can be avoided is an imbecile. Yet, long after the racist 'Irish joke' genre has become obsolete, this tale keeps being retold, because its ambiguity continues to intrigue. Some journeys are indeed too difficult, and perhaps it is the obstinate traveller who sets out without considering alternatives who is the fool.

This paper seeks to identify political strategies that will advance green political commitments in a climate changed world by mapping leading environmental discourses against the constraints of political feasibility – particularly those that arise from international pluralism and developing world demands for energy equity. It responds to a growing literature which argues that radical technological responses are needed because the failure of international mitigation efforts mean that atmospheric

greenhouse gas concentrations will 'overshoot' beyond safe levels (see Jamieson, 2014; Richardson *et al*. 2011; Hamilton 2013) While we are sympathetic to pragmatist arguments, we think it is unlikely that division over the desirability of economic growth or technological solutions can be bridged by rational analysis, because participants in global environmental debates hold fundamentally opposed 'logics of practicality' (or *habitus*) and esteem-linked values (Pouliot 2008; Dickinson 2009). Whereas preservationist arguments for rapid deployment of advanced nuclear technologies and preventative geoengineering are unlikely to persuade most environmental thinkers, critiques of consumerism and economic growth have little resonance in those developing states where GHG emissions growth is fastest and where hundreds of millions of people still lack reliable access to electricity. Environmental choices with planetary implications must be made in a world that is fractured by both stark inequalities and ideological differences.

Division created by recognition that environmentalists' best efforts have failed to avert ecologically destructive climatic change have been most apparent in controversies that followed Paul Crutzen's advocacy for climate geoengineering (2006) and James Hansen's defense of nuclear power (2014). Debates over geoengineering and nuclear power illustrate heightening tensions between rationalist and romantic environmental impulses and between associated values of protection and restraint, between a desire to preserve biotic systems and a distrust of scientific solutions to problems that are intrinsically social. This paper's key contributions are to highlight the increasing incompatibility between preservationist governance and romantic environmentalism and to identify the 'salience' and 'scalability' as guiding principles for preservationist global climate governance. While our analysis implicitly assumes that green political theory might potentially influence political behaviour we are also aware of its limits, so

we seek to articulate an environmental strategy that is mindful of the relationship between rationality and practice-based logics of action in an era of post-ecological politics (Blühdorn 2013).

The paper develops in five sections. The first reviews the ongoing failure of negotiations conducted under the United Nations Framework Convention on Climate Change (UNFCCC) process. We argue that for so long as low-emissions energy sources are not cost competitive it will be nearly impossible to summon political will to put the *global* economy – including those fast-growing developing states that account for the majority of emissions growth – on a trajectory toward decarbonisation. Looking forward we argue that when climate impacts do begin to mount, geoengineering interventions will gain prominence as an alternative to mitigation. For this reason worsening climate change is unlikely to shock communities into making the kind of dramatic changes long advocated by the environmental movement.

In section two we map implications for environmental values. We observe that environmental discourses have simultaneously drawn on Enlightenment rationality through advocacy of science-based conservation policy while also reacting against the Enlightenment's confidence in human mastery over natural forces by cultivating subjectivities characterised by restraint, humility and non-anthropocentricism (Szerszynski 2007, pp. 338-9). The climate crisis transposes longstanding debates between technophilic rationalists and technophobic romantics over the modernization of production techniques to a new terrain (Brand and Fisher 2013). Radical scientific solutions – which include limiting warming through geoengineering and 'bright green' breakthrough energy technologies – now promise to lessen the biophysical impacts of industrial civilisation. These technologies raise invidious dilemmas in which a trade-off arises between protection of the natural world and the hubris of radical technical

solutions, and it is no longer possible to hope that the values of restraint and preservation are entirely compatible.

Section three explicates how the impulse toward environmental preservation might inform a strategy to place the world as a whole on a trajectory toward climate stability. Here we consider the role of green political theory in a context where international value pluralism, and methodological nationalism make ideal climate policy unattainable (Karlsson & Symons, 2014). We argue that the urgent need for radical emissions reductions on a global scale demands *scalable* responses; and that strategies must also be geared toward maximizing international *cooperation* around whatever governance response best combines effectiveness and political feasibility. Section four turns to the romantic environmental impulse to transform human subjectivity. We argue that whereas much green political theory has presented green subjectivities as necessitated by the threat of environmental catastrophe, this agenda has advanced too slowly to provide a globally scalable response climate threats. Cultivation of green subjectivities is nevertheless a valuable goal and we anticipate that justifications for ecological citizenship will prove more compelling if they are not grounded in an apocalyptic imaginary.

In section five we present the case for an aggressive research agenda – that might encompass algae-based CO^2 removal systems, advanced nuclear designs, deep geothermal and other breakthrough technologies – and consider how effectively it responds to the political challenges of post-ecologism and pluralism. While energy research might appear to be the most promising strategy through which to advance preservationist environmental values, its inconsistency with the habitus of the environmental movement counts against its acceptance. Here we respond to Shellenberger and Nordhaus's claim that 'modern environmentalism is no longer capable

of dealing with the world's most serious ecological crisis' (2004, p.6) by suggesting that ecological and eco-modernist voices have such irreconcilable epistemologies that they cannot be brought into productive harmony. While technological interventions now hold the best hope for advancing preservationist values, their promoters must look outside traditional environmentalism for political support.

2. Failure of climate negotiations

The challenge facing global climate negotiations is now widely understood. Bill McKibbon's (2012) Rolling Stone article on 'Global Warming's Terrifying New Math' illustrates why a global political response must ensure that the majority of known reserves of fossil fuels remain in the ground. McKibbon focuses on three numbers: on the consensus that the maximum level of safe warming is 2° Celsius; on the remaining budget of 565 billion tonnes (gigatonnes [Gt]) of CO^2 that might be added to the atmosphere while likely avoiding 2°C of warming; and on the 2,795 Gt of CO^2 stored in known fossil fuel reserves (the fifth IPCC report estimates 469 Gt and 3,000 Gt respectively). A fourth key number – annual carbon emissions of 31.6 Gt in 2012 – explains the time-limited nature of the challenge. If emissions remain unchanged then we will exhaust this entire budget by around 2030.

Global mitigation efforts have not simply failed to halt the rise in atmospheric GHG concentrations, they have – at least until 2012 – failed even to slow growth in annual emissions. The average year-to-year growth rate in the 1980s was 1.9%, in the 1990s it fell to 1.0% due to growing energy efficiency in China and deindustrialization of the former USSR, but has roared back to 3.1% per year since 2000 (Peters *et al*. 2012). If the existing stock of CO^2-emitting energy infrastructure is not prematurely retired its

operations alone will roughly exhaust the remaining 'safe' carbon budget and will see atmospheric concentrations of CO_2 pass 430 parts per million (Davis, Caldeira & Matthews 2010). Indeed, some leading scientists argue that existing atmospheric GHG concentrations have already committed us to in excess of 2°C of warming (Hansen *et al*. 2008; Solomon *et al*. 2009). Meanwhile, an additional 1200 new coal-fired power states are currently proposed globally (Yang and Cui 2012). If constructed, these plants will have an anticipated lifespan of 40-80 years (Davis, Caldeira & Matthews 2010). Owners of this infrastructure, and those with rights over known fossil fuel reserves, will fight to preserve their value for as long as thermal coal and other fossil fuels are economically competitive.

Existing energy systems are also failing to deliver equitable access to modern energy (Bazilian & Pielke 2013). Today, around 1.5 billion people lack any access to electricity, and approximately 3.5 billion rely on biomass (wood, cow dung etc.) for cooking – the impacts of this energy inequality are severe, particularly for women's respiratory health (World Bank 2010, pp. 39-40). In the twentieth century global energy production increased approximately 16-fold (Speth 2004, p. 14). If we aspire to a world in which a global population of 7-9 billion people have secure, equitable access to modern energy then – even in the unlikely event that developed states abandon economic growth – we would likely see global energy production double again over the coming century. Given the dearth of scalable low-emissions energy sources and that most new generation capacity is being installed in the developing world, it is little wonder that even optimistic calculations suggest that two-thirds of the world's energy supply will still come from fossil fuels in 2050 (Kramer & Haigh 2009, p. 569) and that developing states have resisted binding emissions pledges.

The highest ambition of current international negotiations is a binding agreement that will come into effect in 2020 – less than a decade before our entire carbon budget is exhausted. Current indications suggest that this agreement, if successfully negotiated, will be unambitious, so continued warming beyond the 'safe' limit of 2° Celsius seems almost certain. Even with today's warming (approximately 0.8° Celsius) we are seeing species distribution shifting towards the poles, ecosystem stress, and acceleration of species loss.

Why have developed states failed to take effective mitigation action when timely action would advance the long-term interests of each? One answer lies in the international distribution of costs and benefits of mitigation. The harms caused by GHGs emitted today will primarily arise in the distant future and their worst impacts will be visited on impoverished people (Gardiner 2011). In contrast, the costs of averting climate harms are front-loaded. Since energy production is the leading source of GHG emissions, effective mitigation requires decarbonisation of global energy systems. Since nearly all growth in energy demand is in the developing world, this is where the expenses of decarbonisation arise. A World Bank estimate of annual developing world mitigation costs of US$140-$175 billion (2010, p. 257) indicates the scale of this challenge. Given that developing states have multiple competing policy priorities it is improbable and unjust to expect them to meet these expenses alone. It follows that decarbonisation using existing technologies would require a vast international transfer of resources. Given the limited technology transfer that we have seen to date and the problems of accountability associated with the Kyoto Protocol's Clean Development Mechanism (CDM) such a transfer currently seems politically improbable.

Resistance to mitigation using existing technology arises within both national and international politics. Domestic constraints include polarization over the reality of

climate change (e.g., the United States) and economic resistance to increased energy prices (see the collapse of the European carbon price, dismantling of Australia's carbon tax and China's growing caution about emissions pricing). Internationally, states' reluctance to surrender economic advantages to their rivals has undermined international cooperation – particularly between the two greatest emitters and great power rivals, China and the United States. These political barriers seem likely to remain until cheap, scalable, low-emissions energy sources disconnect GHG emission levels from state power. Market and political forces will only align with ambitious global climate policy when low emissions energy sources gain a cost advantage; and only at this point will existing energy infrastructure be decommissioned as non-competitive stranded assets.

2.1 Saved by disaster?

Some environmentalists acknowledge this dismal logic, but nurture hope that at some point climate harms will shock the international community into action or force transition to sustainability (Schneider-Mayerson 2013). Moreover, a commonly held assumption holds that deep cultural and lifestyle changes offer the surest path to sustainability, as many environmentalists conceptualise climate change as primarily a moral problem, which requires a moral inner solution rather than a pragmatic worldly response. For example, Bill McKibben, has described technological responses to climate change as the moral equivalent of segregation: 'Just as the old methods of dominating the world have become unworkable, a new set of tools is emerging that may allow us to continue that domination by different, expanded, and even more destructive means….' (1990, p. 144). Stephen Gardiner (2010, p. 304) echoes this sentiment when he worries that geoengineering will create 'moral corruption' if it obviates the need for radical lifestyle change. This argument has, to date, not moved a pluralist world any closer

towards climate stability. Nevertheless, the belief persists that political will to subsidise global deployment of capital-intensive renewable energy will emerge as the impacts of climate change become more severe. For example, Ulrich Beck (2010, pp. 258-9) welcomes the transformative 'cosmopolitan momentum' that will be unleashed when climate catastrophe creates an imperative to 'cooperate or fail'. Adherents of this view have called on Western nations to lead the way and to demonstrate the feasibility of mitigation through unilateral decarbonisation (Maltais, 2013).

We identify two key reasons why such hopes are misguided. First, the influence of methodological nationalism over climate policy grounds pessimism over the prospects for global decarbonisation. To date, the political response to climate change – as expressed in both targets set by international negotiations and the demands of environmental activism – has sought to apportion national responsibility for specific levels of decarbonisation. There are very good reasons to make the state the target of political mobilisation, yet, conceptualising decarbonisation as a national problem has led to counterproductive policy responses.

Effective mitigation requires that the global economy – including fast-growing developing economies – be placed on a trajectory toward almost complete decarbonisation. If highly motivated states decarbonise using technologies that cannot be scaled up for global application, then the political enthusiasm for climate action might be exhausted without significantly shifting the emissions trajectory of the global economy (Karlsson & Symons, 2015). This appears to be the case in states such as Sweden, the UK and Germany that have used generous subsidies to deploy capital intensive and diffuse energy sources (such as biomass and wind) that it is not technically possible to scale to meet the energy demand of fast-industrialising developing states (Ausubel, 2007; Moriarty & Honnery, 2012; Trainer 2010). If affluent states expend their intellectual and

financial capital on measures that do not address developing world energy needs, then an opportunity to contribute to a global solution will be lost. Moreover, the moral prescription against economic growth and material consumption developed by first world environmentalism (Blühdorn 2013), has little resonance in developing states where a majority of people still lead modest lives and often lack access to modern energy. Were the impulse toward Western climate leadership directed toward developing scalable low-cost energy sources, the prospects for effective global policy would be brighter.

Our second key reason for doubting that future climate harms will drive a green political renaissance, is that once warming reaches a critical point it is likely that the stop-gap technology of solar radiation management (SRM) will become politically attractive. SRM describes forms of intentional geoengineering that seek to counteract climate change by blocking the earth's absorption of solar energy. Since SRM has the potential to negate the warming associated with GHG emissions, albeit with significant side-effects, its implementation will likely blunt signals that might otherwise build political support for aggressive mitigation action. SRM may thus allow GHG emissions to continue apace, ushering in an era of continuing ocean acidification, changing atmospheric chemistry, and altered weather patterns. While this future sounds dystopic, we doubt that it is sufficiently bleak to prompt necessary political change.

Indeed, early survey data in the US, Canada and the UK finds strong public support for geoengineering research alongside uncertainty about the appropriateness of implementation (Mercer *et al*. 2011). Meanwhile, political support is building. The Intergovernmental Panel on Climate Change (IPCC) covered geoengineering in its Fifth Assessment Report (2013); a UK a government report has called for a cooperative international research program and governance agreement (UK House of Commons

2010); in the United States influential actors are working to promote a national geoengineering strategy (Bipartisan Policy Center 2011); and a non-governmental Solar Radiation Management Governance Initiative is working to link epistemic communities on a global basis (Edney and Symons 2013). While most environmentalists see climate engineering as hubristic, dangerous and unnecessary, influential free-market think tanks are laying groundwork for implementation. Moreover, detailed feasibility analysis has found that several different SRM techniques, that are already within the technological capacity of advanced states, could negate the warming impact of GHGs for under US$8 billion per year for the next five decades (McClellan *et al*., 2012).

It is common for people who care for the health of biotic systems and suffering of vulnerable people to react with horror to the prospect of SRM. Believing that we already have the technologies to avert climate change in hand, they anticipate that communities will accept far-reaching reductions in consumption rates rather than face such risks. Yet, history is replete with examples of unnecessary ecological and humanitarian tragedies that were not prevented. In the last half century 10-30 per cent of all species have been threatened with extinction, approximately 60% of ecosystem services have been degraded, and the biomass of targeted fisheries has been reduced by approximately 90% (MEA 2005). This ecological destruction has occurred alongside the persistent, avoidable malnutrition of about one billion people. We have also become accustomed to living with radical interventions into nature – from genetically modified crops to industrialised animal suffering through factory farming. If SRM offers a 'solution' to climate change, which allows present economic and social dynamics to proceed unchallenged, it is likely to command significant support. Risks, such as disrupted monsoons and the loss of coral reefs to acidification are grave, but past experience gives little reason to anticipate that

humanity will shun a hubristic technical solution. Consequently, the political paralysis blocking ambitious climate action may persist for many decades.

3. Lessons from failure: Conflict among environmental values

Climate change has inherent characteristics that make it enormously difficult to address, so the environmental movement's failure to craft a timely and effective response was perhaps inevitable. Nevertheless, we must now take continuing climatic change as a given, rather than as a threat that can be entirely averted. Governing unsustainability poses invidious choices. For example, bioclimatic modelling suggests that early intervention using SRM would preserve habitats such as coral reefs (and thus species) that will otherwise be lost (Couce et al. 2013). Many environmentalists oppose SRM as a risky intervention in nature, despite scientific modelling predicting benefits for biological diversity. Debates over deployment of SRM must increasingly be seen as a choice between two different sets of anthropogenic climatic changes, rather than as a choice between virtuous emissions constraint and hubristic planetary intervention. In assessing how green political theory should respond, we first briefly map environmental values, and the dominant discourses that seek to enact them. Invidious choices require prioritization; reflecting on these choices highlights the growing conflict between post-ecological 'rationalist' preservationist and traditional 'romantic' green discourses.

John Dryzek's seminal account primarily distinguishes environmental discourses by their relationship with *industrialism* – and more specifically whether they advocate radical or reformist, imaginative or prosaic departures from a commitment to 'growth in the quantity of goods and services' (1997, p. 12). While Dryzek's typology captures key features distinguishing environmental perspectives, he posits the 'imagery of [future] apocalypse' as a figure that drives the radicalism of some approaches and argues that

discourses of 'problem solving and limits' are energized by the possibility of dissolving 'conflicts between environmental and economic values' (1997, p. 12-14). All discourses Dryzek surveys in the original 1997 edition view ecological crisis as avoidable; nothing anticipates the subsequent emergence of eco-pragmatist perspectives that view winding back consumerism as politically impossible; of post-environmental perspectives that view accelerated growth as a precondition for environmental protection; of a constructivist view that sees sustainability, limits and apocalypse as culturally mediated concepts; or of post-ecological perspectives that resist technological primitivism (McGrail 2011, p. 119-124).

Ongoing failure to arrest climate change has enhanced the significance of Dryzek's division between 'romantics' and 'rationalists'. Green political thought has always had a complex relationship with the Enlightenment; the early environmental movement critiqued confidence in human dominance and technological mastery over nature and advocated the cultivation of green subjectivities characterised by restraint and humility (Plumwood 2002). Yet, environmental discourses have also deployed Enlightenment rationality in a reflexive critique of capitalist industrialism and of the collective irrationality (market failure) of exploitation of ecological resources (Szerszynski 2007, pp. 338-9). The early waves of environmentalism generally anticipated that these impulses toward protection of the natural world and humility/restraint were innately compatible. For example, Dryzek explains that green romantics commonly believe that if only communities embrace an ecological subjectivity then resolution of real world environmental problems will 'fall into place' (1997, p. 167).

Two decades ago Henry Shue described sustainable development's promise of harmonizing environmental protection and economic development as 'fudge' (1995, p. 460). Today, as economic development has shifted a preponderance of global GHG

emissions to Southern states whose populations for obvious reasons hold strongly 'materialist' values, the claimed compatibility between environmental protection and technological restraint also looks increasingly fudgy. Highly technical responses to many environmental challenges promise outcomes that can be predicted to maximise aggregate human or environmental welfare for any given atmospheric concentration of GHGs– yet, the attendant risks of intentional intervention are incompatible with romantic environmentalism.

If we have reached a point where ongoing climate change, ocean acidification and biodiversity loss are inevitable, then green political theory must now navigate the period of overshoot beyond 'safe' ecological limits by informing choices between different bundles of environmental harms. As Christopher Preston notes, emerging climate threats and the prospect of geoengineering challenge environmental ethicists to confront 'questions of the relative value of human interests against those of natural processes' and also the relative values of 'the integrity of fundamental biogeochemical processes relative to the value of species (and persons) under threat' (2011, p. 473-4). Key divisions are emerging between environmental realists who advocate accelerated deployment of technical solutions because they assume that developing world demands for 'modern' lifestyles make degrowth impossible, and green romantics who resist technological hubris as they assume that interventions in nature (such as genetic modification, next generation nuclear energy and climate geoengineering) will have adverse unanticipated consequences. While Vandana Shiva and Paul Crutzen may both be motivated by environmental concerns, their respective positions reflect their differing relationships with Enlightenment rationality. Green romantics and green rationalists now face off on opposing sides of critical debates.

Eco-modernist discourse that identifies technological innovation as the most politically viable path toward addressing environmental challenges offers an important new perspective. Yet, it has not shifted the energies of the amorphous environmental movement. If anything, there is growing confusion about where to go next and this lack of consensus risks undermining public support for any action. Radical environmentalists of different stripes are inspired by diverse visions: of frugality and sacrifice, adoption of new 'breakthrough' energy sources (including generation IV nuclear) and for preservationist technological interventions (e.g., wilderness watched over by satellite guided drones); meanwhile an inadequate governmental response to the ecological crisis grinds on. The UNFCCC negotiation process combines global emissions trading (inspired by Friedrich Hayek) with the old politics of bargained international treaties. A fragmented patchwork of national, regional and global emissions trading schemes create weak incentives toward decarbonisation (Zelli 2011), but are vulnerable to myriad forms of gaming and fraud and have won such minimal public enthusiasm that modest emissions prices have been insufficient to drive significant decarbonisation. Meanwhile, international negotiations are bogged down in great power conflict (neither the US nor China will allow the other comparative gains), north-south conflict (the south claims a right to develop, and the north declines the mitigation bill). Bright green, pragmatist and romantic perspectives all call for change, but have failed to build sufficient consensus around plausible next steps in any direction.

If we accept Ulrich Beck's argument (2011, p. 129) that environmentalism will fail if it is not 'at least as powerful as the modernizing urge', then we must also consider whether bright green environmental thinking that seeks to harness the modernizing urge, might be failing because it, in turn, is less powerful than traditional environmentalism. Rational analysis is unlikely to dissuade environmentalists from a

practice-informed commitment to technological restraint, and might create an impression of confusion. A forward-looking strategy that can win broad political support (potentially outside the environmental movement) is required, and this strategy must address some of the inherent challenges of climate mitigation action. In the next three sections, we consider how the impulses toward protection and technological restraint might be expressed in a green political theory fit for a climate changed world.

4. The rationalist impulse

If green theory is primarily defined by a normative concern for 'protection of the natural environment' (Humphrey 2010, p. 573) then it requires a social theory capable of translating this impulse into action. This begs the question of what strategy might ultimately stabilise the global climate given all the technical, social and political barriers? While there is a growing literature exploring the social structures and discourses that might ultimately sustain ecological values in the developed world (Buck 2013, Vezirgiannidou 2013), the urgency of the climate challenge and its inseparability from developing world energy equity also demands an immediate governance response. We argue that it is futile to try to identify any *a priori* solution to climate stabilization. Instead we identify two characteristics – salience and scalability – that ensure approaches are adaptive to political realities and technically capable of providing a global response. Here salience describes responding to political momentum and scalability refers to the capacity to deliver sufficient low-emission energy to supply burgeoning global energy demand.

4.1 Salience

If the purpose of global climate governance must be to achieve cooperation around global responses that minimise atmospheric GHG concentrations (assuming SRM is not a preferred response), this raises the question of what institutional arrangements might achieve this outcome. We turn to international law, which has long grappled with the challenges of international coordination, to draw on a principle of 'salience' that Ronald Dworkin (2013) argues should guide progress toward a more legitimate international legal order. Dworkin's claim is that international law (like climate policy) must engage a world of fractured epistemologies and narrowly conceived interests. Where an area of cooperation arises that achieves a useful purpose (even in a sub-ideal way) there should be a presumption that others join (e.g., carbon trading may be imperfect, but if it is partly effective in promoting cooperation around scalable activities, then it should be supported because there is institutional momentum behind it). Dworkin (2013, p. 19) describes the principle of salience in the following terms:

> 'If a significant number of states, encompassing a significant population, has developed an agreed code of practice, either by treaty or by other form of coordination, then other states have at least a prima facie duty to subscribe to that practice as well, with the important proviso that this duty holds only if a more general practice to that effect, expanded in that way, would improve the legitimacy of the subscribing state and the international order as a whole.'

The salience principle provides a reason to support institutional responses that are amassing a critical mass of international support, provided that those responses support scalable solutions to climate threats. This emphasis on salience has the potential to suggest a pragmatic resolution to the long-running debate among economists, environmentalists, and policy makers over the relative desirability of emissions trading schemes, carbon taxes, regulatory measures, environmental education and lifestyle changes, subsidies for low-emission energy and government investment in energy

innovation. All these strategies have some potential and our goal should be to refine and improve those models that are best developed, most politically saleable and most conducive to scalable international solutions. Dworkin's concept of salience suggests that knowledge of ideal solutions may be of limited relevance to the design of international responses.

Some 'bright green' or 'realist' thinkers despair of the UNFCCC process and recommend its abandonment while others suggest that climate action is so politically difficult that emissions mitigation should primarily be achieved as co-benefits of more popular projects such as air pollution control (see Victor 2011; Prins *et al*. 2010). We suspect that those who call for the abandonment of existing governance efforts are making an unattainable ideal the enemy of the good, given the inherent challenges of climate policy, the multiple contradictory possible responses and the complexity of achieving international cooperation amid diverse national interests and perspectives. For all their failings, the IPCC and UNFCCC processes have summonsed an unprecedented global intellectual engagement. For example, one positive outcome of the Cancun Agreements was that it required detailed biennial, developing-state reporting of greenhouse gas emissions (see Breidenich 2011, p. 9-12). As a result, every UNFCCC member state must now develop (with assistance in many cases) the capacity to assess emissions. Building understanding of a problem is a necessary precursor to its solution.

4.2 Scalability

Developing world energy demand – whose satisfaction is also prompted by justice considerations – implies that international climate negotiations and institutional responses should focus on promoting solutions that are globally scalable. With around half of the global population relying on polluting biomass for cooking, and lacking sufficient energy for refrigeration, development of scalable, low-cost, low-emissions

energy sources or of ultra-low-cost CO^2 removal technologies (such as algae systems that produce fuel or food as co-benefits) must be a priority. The mismatch between the developing states in which emissions growth is highest and the (mostly European) developed states that are most committed to emissions reductions challenges effective climate policy (Victor 2011). At the same time, the scale of developing world demand for modern energy, and the calls for Western environmental leadership, also have implications for the kinds of response that might be productive. Western states' efforts to reduce GHG emissions must put the global economy on a de-carbonising trajectory. As we have seen, if affluent states decarbonise using non-scalable technologies that are dependent on geographical features that cannot be replicated elsewhere (such as through the use of biomass or hydro-electricity), this effort will be largely futile. To date UNFCCC national targets have not distinguished between scalable and non-scalable activities. Setting national targets that reward advances in scalable energy sources would be one way for the UNFCCC to promote global solutions.

Recognising the significance of scalability also requires some consequentialist rethinking of the concept of environmental leadership as a component of ecological justice (Eckersley 2012; Maltais, 2013 see also Grasso 2013). Where much discussion of climate justice has emphasised the necessity for Western leadership, this analysis has too often focused on unilaterally decarbonizing Western economies, providing international financial assistance and equalising per capita national emissions. However, as is evidenced by the limited funding of the Copenhagen Green Climate Fund, Western enthusiasm for such leadership is limited and has yet to deliver an effective global response. In this context, some economists have advocated that the West's moral obligation to lead should ideally be discharged through investment in in energy research (Garnaut 2011, p. 118). Contra those who argue that energy research should replace

existing mitigation efforts, the principle of salience leads us to propose that national commitments to energy research should be integrated into UNFCCC negotiations.

5. The romantic impulse

Returning to Dryzek's distinction between rationalist and romantic impulses, we must recognise that green romanticism has made an important practical contribution to environmental protection, by inculcating social recognition of values that are not exclusively instrumental, and by demanding that the non-human world be incorporated into policy making processes. Nevertheless, the romantic environmental impulse has proven incapable of arresting either the first world's transition to a post-ecological age of governed unsustainability (Blühdorn 2013), or the developing world's demand for materially intensive economic growth. The stage is now set for some very sad rationalist 'solutions' to the environmental crisis and the continuation of many practices that include ruthless domination of non-human animals, the destruction of natural habitats and the escalating alienation of humanity from nature.

Thomas Princen writes that if 'there were a single philosophical position in environmental thought, adhered by all who are concerned about environmental destruction, it is that at the root of that destruction is human's separation from nature' (Princen 2011, p. 82). While it is now clear that bridging this divide through the ethical transformation of people everywhere has not offered a timely response to the threat of climate change, we argue that there are many other valid reasons for seeking a life characterised by non-domination and expanding our moral universe beyond strictly anthropocentric norms. A case in point is how critique of the industrialised killing of non-human animals has collapsed into instrumentalist discussions of the climate impact of

specific animals (Smil 2013), rather than a wider rejection of animal domination. In fact, eschewing apocalyptic imagery may open up a space for more powerful justifications. Recognition that 'logics of practicality' and esteem-linked values drive environmental behavior (Pouliot 2008; Dickinson 2009) suggests that a scalable green mass movement is more likely to emerge grounded in non-rational practices (e.g. ritual and spirituality) than as a calculated response to apocalyptic threats.

More generally, rather than averting immediate environmental catastrophe, the greening of human subjectivities can be seen as gradual social progress towards greater psychological maturity and the diffusion of post-materialist values (Wapner 2010, p. 46). However, there is an important distinction between encouraging such processes and imposing them on developing world populations. Moving forward, it seems crucial to avoid absolute value conflicts and the kind of 'logical schism' that climate change has given rise to between 'sceptics' and those convinced about the existential risks it presents (Hofmann, 2011). In a pluralist society, it is not in any way surprising that people disagree about a problem whose implications are so broad and far-reaching as climate change (Hulme, 2009). While greater political agreement may eventually be forthcoming (just think how fiercely universal suffrage was once contested), the global environment cannot be taken 'hostage' to this process or used as a vehicle to ram through fundamental social changes that many people oppose on reasonable grounds. In light of this, we argue that nurturing green subjectivities should be freed from the burden of saving the planet and rather advocated for its intrinsic worth.

As we move deeper into the Anthropocene, radical demands to scale down may become more pronounced (Crist, 2013, p. 144). This development is likely to heighten many of the tensions discussed above and some may think that it is naïve to suggest that romantic environmentalism can flourish without being justified as a response to

existential risks. However, for many people, an ethic of restraint and non-domination offers a satisfying answer to the dilemmas of authenticity, alienation and the general loss of meaning in late-modern society. Romantic environmentalism seeks to restore what Martin Heidegger once called 'Bodenständigkeit' or the rootedness of life in the soil (Zimmerman, 1990), something that may be increasingly difficult in a climate changed world. Yet, interpreted as an individual aspiration rather than a question of absolute social states, it still seems viable as an ethical theory for the future.

6. Eco-Modernism against Environmental Logics of Practice

The case for energy research that has been advanced by scholars associated with the 'Breakthrough Institute' is possibly the most politically influential example of rationalist environmentalism. Arguments to reduce the environmental impact of agriculture with GM crops or to address the biodiversity impacts of climate change through SRM raise similar questions: are technophilic approaches capable of advancing green values in a post-ecological era, or will they become another excuse for inaction and delay? In the United States, the domestic political prospects for energy research appear much brighter than for deep emissions cuts through carbon pricing (Jenkins, 2014). At the international level, effective climate action is opposed by powerful energy exporting states and companies that wish to preserve the value of their existing fossil fuel reserves and so are strongly motivated to resist an effective international mitigation agreement. While successful research and development of low-cost energy sources would also have distributional consequences for existing market players, these implications are less direct and less likely to attract political mobilization. In the early stages of relatively 'pure' energy research, implications for existing market players would be unclear. Once new

technologies neared the point of commercialization and deployment they would attract private sector backers that could provide both financial capital and political support.

Turning to international politics, economic analysis suggests that underinvestment in both mitigation and energy research has the same root cause. Investments in either sector will bring significant positive externalities (a safer climate or cheaper, cleaner energy) that will be captured by other actors. If it is not possible to capture the full benefits from investments in mitigation or energy research, then rational actors will fail to achieve an aggregate level of investment that is in their collective interests (Barrett 2007). Moreover, uncertainty and long time-scales count against both. However, formal game-theory analysis suggests that the prospects for international energy research cooperation are comparatively bright, both because the near-term national cost-benefit ratio of investment in energy research is more favourable (the greatest benefits of traditional mitigation accrue in the distant future) and because reciprocal agreements under which multiple parties agree to an equivalent energy research and development effort can enable each party to capture a greater percentage of the global benefit (Urpelainen 2012).

Advocates of energy research are divided over whether unilateral national efforts or some form of international treaty is most desirable. Game theoretical analysis suggests that the later should be preferred by rational states, and an international treaty should theoretically boost efficiency by allowing international coordination and specialization (Urpelainen 2012). Incorporating energy research in the existing UNFCCC negotiation process has the potential to lessen North-South tensions over implementing 'common but differentiated responsibility'. This is because Western states may be more willing to take on disproportionate responsibility for technological research than to directly surrender economic competitive advantage through emissions constraint and

financial transfers. Leading developing states – such as China – may also wish to participate because of a strategic interest in lifting research capacity. However, unilateral efforts aligned with nationalist sentiment might attract stronger domestic political support. For example, the Breakthrough Institute's 'Apollo Alliance', sought to unite major US environmental groups and labour unions behind rapid transition to hi-tech clean energy, and Japan's announcement in 2013 of a less ambitious national emissions target was accompanied by a unilateral commitment to increasing its research effort.

While energy research is theoretically promising as a response to climate change, there is also a serious risk that it could become yet another excuse for inaction. The long time horizon for energy research creates risks of governance failure and diversion of resources by powerful rent-seekers akin to those that have plagued government support for renewable energy (Helm 2010). Worse, negotiation of cosmetic treaties, designed only to satisfy political demands for climate action is a real possibility. The example of the 2005 Asian Pacific Partnership on Clean Development and Climate, which achieved little and was quietly wound up in April 2011, has understandably led many people to believe that cooperative energy research is simply a ruse perpetrated by governments seeking to avoid genuine climate action. Yet, hypocritical commitments open opportunities for political action demanding their fulfillment (Risse and Sikkink 1999). One important conclusion we draw is that advocates of environmental protection should not simply grudgingly accept that energy research is a necessary part of an effective climate response, but should also engage politically to demand that this research actually occurs.

Identifying the political strategies that might allow a research-focused climate strategy to succeed is an important task that is largely beyond the scope of this paper.

The global dimensions and long-timescale of climate change mean that any governance response is highly vulnerable to moral hazard, free-riding, capture and rent-seeking. There is clearly a need for technically informed and normatively committed scientific epistemic communities to first outline the requirements for a successful research effort. This work would need to identify transparency protocols and oversight mechanisms to maximise the ongoing capacity of epistemic communities, international civil society and foreign states to hold national research efforts to account.

7. Conclusion

After decades of political procrastination, the spectre of yet more inauthentic ecopolitics (Blühdorn 2011) looms large over any suggestion that the environmental movement should reconsider its priorities or ambitions. At the same time, it is becoming increasingly evident that existing environmental strategies have been unable to avert dangerous climate change. Although the green romantic impulse toward restraint was central to the victories of the twentieth century environmental movement, this same impulse also leads most environmentalists to instinctively oppose breakthrough energy research into, for example, advanced nuclear technologies. While green political thinkers may grudgingly accept the intellectual case for aggressive energy research, this has never been a central demand of the environmental movement. As a result, those promoting inaction have been able to take cover behind the strong intellectual case for a research-focused response, without being held to account.

While the rational case for energy research as a response to developing world energy demand is strong, it is unlikely to convince those sections of the environmental movement that hold logics of practice acquired in earlier battles in defense of ecological

values. As we have seen, these values are of continuing value, even though they are poorly suited to addressing the global dimensions of energy and climate challenges. For this reason we conclude that rationalist preservationism must part company with ecologism. Global energy and climate governance, and promotion of social movements that nurture political practice are both important to the promotion of green political values in a climate changed world. Yet, they are also irreconcilable. Although political engagement is needed to ensure that an effective research program delivers cheap, scalable, advanced energy technologies, this preservationist project is unlikely to gain mass support among traditional environmentalists.

No solution, no matter how theoretically perfect, can bring about global decarbonisation without sufficient institutional and political backing. This is why Dworkin's concept of salience is crucial in a world characterised by deep political and epistemological pluralism. The challenge of political cooperation and coordination means that it is wise for all advocates of climate action to draw on existing political momentum rather than to insist on solutions that exactly match their own epistemologies and values. Yet, rational, technophilic preservationism is so alien to the of mainstream environmentalists' logics of practice that it must recruit new constituencies if it is be politically successful.

In this paper, we have discussed climate change and not broader environmental challenges. Some believe that research on mitigation technologies should form part of a wider bright-green push to address other sustainability challenges. At the same time, it is important to recognise that many environmental problems may not so much require technological solutions as precisely the kind of greening of human subjectivities that has proven so acutely inadequate to address global climate change. Examples such as the construction of more livable urban spaces, greater use of bicycles for personal mobility

and reduced meat consumption all come to mind. Yet, when faced with the existential dangers of a climate changed world, green political theory needs to fundamentally rethink how it sees the linkages between technological innovation, global development and environmental change in ways that would be capable of accommodating the diversity and pluralism of existing societies.

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