

# Climate change, environmental justice and the unusual capacities of posthumans

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*In this article, we theorise and develop a posthumanist and new materialist approach to sustainable development policy. We trace a humanist and anthropocentric emphasis in policy discussions of ‘sustainable’ that reaches back almost 50 years, and still underpins recent United Nations (UN) statements on sustainable development. This UN approach has tied policies to counter environmental challenges such as anthropogenic climate change firmly to sustaining and extending future human prosperity. By contrast, we chart a path beyond humanism and anthropocentrism, to establish a posthumanism environmentalism. This acknowledges human matter as an integral (rather than opposed) element within an all-encompassing ‘environment’. Posthumanism simultaneously rejects the homogeneity implied by terms such as ‘humanity’ or ‘human species’, as based on a stereotypical ‘human’ that turns out to be white, male and from the global North. Instead, ‘posthumans’ are heterogeneous, gaining a diverse range of context-specific capacities with other matter. Some of these capacities (such as empathy, altruism, conceptual thinking and modelling futures) are highly unusual and—paradoxically—may be key to addressing the current crises of environmental degradation and anthropogenic climate change.*

**Keywords:** *climate change, environmental justice, new materialism, posthumanism*

## 1 INTRODUCTION

One of the ontological opportunities supplied by the new materialisms derives from their acknowledgement that all matter, both ‘human’ and ‘non-human’, ‘animate’ and ‘inanimate’ possesses capacities to materially affect<sup>1</sup> — an attribute that in modernist social science and some humanities has conventionally been restricted to human agents.<sup>2</sup> This recognition has enabled new materialist ontology to step beyond a culture/nature dualism that has been a feature of much social science,<sup>3</sup> thereby enabling a more thorough engagement with a range of phenomena that are both ‘natural’ and ‘cultural’. Not least among these are environmental sustainability and the challenge of anthropogenic climate change.<sup>4</sup>

Cutting across a nature/cultural opposition<sup>5</sup> should not, however, be taken to imply that the new materialisms collapse disparate kinds of matter (an apple, a tiger, a human body, a stone, the wind) into a singular amorphous mass — as some critics of the perspectives have suggested.<sup>6</sup> Rather, this ontological move has the effect of replacing dualism with multiplicity.<sup>7</sup> Among other

<sup>1</sup> G Deleuze, *Spinoza: Practical Philosophy* (San Francisco: City Lights, 1988), 11.

<sup>2</sup> DH Coole and S Frost, ‘Introducing the new materialisms’, in DH Coole and S Frost (Eds.), *New Materialisms. Ontology, Agency, and Politics* (Durham, Mass.: Duke University Press, 2010), 1–43, 8.

<sup>3</sup> NJ Fox and P Alldred, *Sociology and the New Materialism* (London: Sage, 2017), 25.

<sup>4</sup> NJ Fox and P Alldred, ‘Reassembling climate change policy: Materialism, posthumanism, and the policy assemblage’ (2020) 71/2 *British Journal of Sociology* :269–83.

<sup>5</sup> I van der Tuin and R Dolphijn, ‘The transversality of new materialism’ (2010) 21/2 *Women: A Cultural Review* 153–171.

<sup>6</sup> See for example, B Braun, The 2013 Antipode RGS-IBG lecture on new materialisms and neoliberal natures ((2015) 47/1 *Antipode*, 1–14; S Lettow, ‘Turning the turn: New materialism, historical materialism and critical theory. (2017) 140/1 *Thesis Eleven*, 106–121, 107

<sup>7</sup> G Deleuze, and F Guattari, *A Thousand Plateaus* (London: Athlone, 1988), 20.

things, this has the effect of problematising aggregative and unitary categories such as ‘human’, ‘humanity’ and ‘inanimate’.

In this article we use these insights as a starting point to theorise and develop a post-anthropocentric perspective that draws together issues of sustainable development, environmental justice and social inequalities within a new materialist framing. We follow a trajectory that leads beyond both humanism (an overarching concern with human well-being and social justice) and its antithesis: anti-humanism, to posthumanism (terminology fully defined below). We draw upon feminist materialist and posthuman scholars, who argue for the affectivity or vitality of all matter<sup>8</sup> — and upon non-Western and indigenous ontologies in which ‘a multiplicity of beings cast as human and nonhuman — people, plants, animals, energies, technological objects — participate in the coproduction of socio-political collectives’.<sup>9</sup> Such approaches offer the possibility of achieving what Rosiek et al have called a ‘sense of responsibility to something more than human’.<sup>10</sup> Such approaches establish a posthuman ecological perspective that sees humans as fully integral to the environment. In turn, this destabilises conventional notions of ‘sustainable development’ set out in successive policy statements, which we shall argue have retained an anthropocentric (a perspective that places humans and their concerns centre-stage) focus on human well-being. Instead, we promote an understanding of sustainability as ecological potential.

At the same time, a posthuman perspective is critical of terms such as ‘humanity’ and ‘human species’. Such terminology aggregates and homogenises bodies with disparate capacities, often asserting a narrow and privileged model of the ‘human’.<sup>11</sup> These aggregating tendencies have been revealed by scholarship on ‘environmental justice’/‘climate justice’<sup>12</sup> that acknowledges the vast divergences between humans in terms of a) the contributions they make to anthropogenic climate change; b) how climate change will impact their lives; and c) their capacities to alter their behaviour in order to reduce their negative impact on the environment or to positively counter the effects of climate change.

To move beyond such aggregations, we adopt Rosi Braidotti’s alternative terminology of ‘posthumans’ and ‘post-humanity’, which acknowledges the diversity of individual bodies in terms of capacities to act and interact.<sup>13</sup> We shall argue that any policy to address threats to environmental sustainability such as anthropogenic climate change and environmental degradation must recognise the diversity of posthumans, and the complex interactions of race, gender, material prosperity and geography that produce these differences. Recognising posthuman diversity overcomes both the narrow focus of humanism on social justice and anti-humanist inclinations to regard ‘humanity’ as the enemy of all other matter.<sup>14</sup>

The posthumanist perspective instead considers posthumans as an integral part of ‘the environment’ — not separate from it — and as possessing rights to achieve their potential, as should be accorded to all matter. This shift requires that we acknowledge fully the capacities of posthumans, some of which capacities are highly unusual and rarely seen elsewhere in the known universe. These include the capacity to attribute meaning to — or otherwise conceptualise — events; to act altruistically towards unknown others; to imagine the future and create technologies to deliver it; and to use reason to theorise, predict or anticipate future or unseen

<sup>8</sup> J Bennett, *Vibrant Matter* (London: Duke University Press, 2010); R Braidotti, *The Posthuman* (Cambridge: Polity, 2013); D Haraway, *Cyborgs, Simians and Women* (London: Free Association Books, 1991).

<sup>9</sup> J Sundberg, ‘Decolonizing posthumanist geographies’ (2014) 21/1 *Cultural Geographies* 33–47, 33.

<sup>10</sup> JL Rosiek and J Snyder and SL Pratt, ‘The new materialisms and indigenous theories of non-human agency: Making the case for respectful anti-colonial engagement’ (2020) 26/3 *Qualitative Inquiry*, 331–346, 12.

<sup>11</sup> R Braidotti, *Nomadic Theory* (New York NY: Columbia University Press, 2011) 82.

<sup>12</sup> D Schlosberg, and LB Collins, ‘From environmental to climate justice: Climate change and the discourse of environmental justice’ (2014) 5/3 *Wiley Interdisciplinary Reviews: Climate Change* 359–374.

<sup>13</sup> Braidotti, n 8; R Braidotti, *Posthuman Knowledge* (Cambridge: Polity, 2019).

<sup>14</sup> M Kowalik, ‘The rise of anti-humanism’ (2018) 62/5 *Quadrant* 60–61.

events. In the concluding section of this article we shall argue that, paradoxically (given the part that some posthumans have played in producing anthropogenic climate change), these unusual capacities will be essential to address the imminent crisis of global climate change. We also set out some ways in which these capacities might be harnessed.

## 2 SUSTAINABLE DEVELOPMENT: ANTHROPOCENTRISM, HUMANISM, AGGREGATION

For the past 30 years, ‘sustainable development’ has become an explicit objective within policy initiatives on topics including housing, food, transport, employment, and energy production/consumption. Typically, it has been predicated upon the needs and desires of current and future human generations. Thus, in 1987, the *Report of the World Commission on Environment and Development* (commonly known as the Brundtland Report) defined sustainable development as ‘development that meets the needs of the present without compromising the ability of future [human] generations to meet their own needs’.<sup>15</sup> Two decades on, the United Nations *Millennium Ecosystem Assessment* (established at the behest of UN Secretary-General Kofi Annan in 2001) confirmed its aim as: ‘to assess the consequences of ecosystem change upon human well-being and to establish the scientific basis for actions needed to enhance the conservation and sustainability of those ecosystems, so that they can ‘continue to supply the services that underpin all aspects of human life’.<sup>16</sup>

Whitehead has traced this anthropocentric focus in sustainable development discourse back to 1972, and to a speech on ‘the pollution of poverty’ by Indian premier Indira Gandhi at the first United Nations conference on the Human Environment (UNCHE).<sup>17</sup> Ghandi’s intervention established a thread in North/South global environmental politics in which environmental protection and economic development are treated as ‘mutually supportive’,<sup>18</sup> and conversely establishing that poverty and environmental degradation (such as illegal logging of rain forest by indigent farmers) go hand in hand.<sup>19</sup> This theme has echoed down through subsequent UN statements on sustainable development, even though the claimed positive relationship between economic development and environmental protection is highly questionable<sup>20</sup> and, in many cases, antagonistic.<sup>21</sup> So, for example, the United Nations *Agenda for Sustainable Development 2030* argues that social justice and environmental protection are ‘integrated and indivisible’ goals.<sup>22</sup>

This anthropocentrism within sustainable development policy is further manifested in suggestions that humans are exceptional or a special case. Thus, the *5<sup>th</sup> Assessment Report of the Intergovernmental Panel on Climate Change* argued for a comprehensive approach based on the assertion that (unlike other living entities) human well-being depends on economic, social and environmental sustainability:

<sup>15</sup> G Brundtland, M Khalid, S Agnelli et al, *Our Common Future (The Brundtland Report)* (Oxford: Oxford University Press, 1987).

<sup>16</sup> World Health Organisation, *Ecosystems and Human Well-Being — A Report of the Millennium Ecosystem Assessment* (Geneva: WHO, 2005), ii.

<sup>17</sup> M Whitehead, ‘Sustainability’ in C Death (ed.), *Critical Environmental Politics* (London: Routledge, 2014), 257–266.

<sup>18</sup> Whitehead, M. (2014a). Sustainability. In P. Cloke, P. Crang, and M. Goodwin (Eds.), *Introducing Human Geography* (pp. 448–460). London: Routledge, p. 452.

<sup>19</sup> Whitehead, n 17, 259.

<sup>20</sup> Rees, W. E. (2003). Economic development and environmental protection: An ecological economics perspective’. *Environmental Monitoring and Assessment*, 86(1), 29–45.

<sup>21</sup> Wallis, V. (2010). ‘Beyond “green capitalism”’. *Monthly Review*, 61(9), 32

<sup>22</sup> United Nations. (2015). *Transforming our World: The 2030 Agenda for Sustainable Development*. UN General Assembly Resolution 70/1. Geneva: United Nations.

<https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>, p.1.

Sustainability in the economy refers to the preservation of standards of living and the convergence of developing economies towards the level of developed countries. Sustainability in the social sphere refers to fostering the quality of social relations and reducing causes of conflicts and instability, such as excessive levels of inequality and poverty, lack of access to basic resources and facilities, and forms of discrimination. Sustainability in the environmental sphere refers to the conservation of biodiversity, habitat, natural resources and to the minimisation of impacts upon ecosystems generally.<sup>23</sup>

The 17 objectives agreed by world leaders in 2015 at the UN Sustainable Development Summit<sup>24</sup> further illustrates this anthropocentric and exceptionalist focus. Later released as the United Nations' *2030 Agenda for Sustainable Development*, the Summit's overarching anthropocentric commitment was set out explicitly in its opening paragraph as

a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom. We recognize that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development.<sup>25</sup>

Moreover, of its 17 objectives, 13 address aspects of human well-being, such as ending poverty, achieving gender equality, access to clean water and affordable energy. Only three (on climate action, and conserving marine and terrestrial wildlife) focus on the non-human environment, while one concerns both human and non-human.<sup>26</sup>

In terms of applied sustainability policy (for instance, policies addressing environmental degradation and more recently anthropogenic climate change), such anthropocentrism and humanism have supplied a foundation for 'liberal environmentalism',<sup>27</sup> a position that aims to 'nudge' humans towards actions enhancing environmental sustainability (for instance, reducing waste and meat consumption) without critical assessment of the wider impacts of human population and economic growth on environmental degradation.<sup>28</sup> This policy approach is given a further neoliberal twist in 'green capitalist' assertions that economic development, free markets and entrepreneurialism can save Earth from climate change through competition and the development of technologies.<sup>29</sup>

These policies, and the actions they spawn, perpetuate the anthropocentrism that sets humans apart from (perhaps even 'above') the environment, both in terms of 'needs' and 'rights'. We would argue (from a new materialist and posthumanist perspective) that there are two foundational flaws in this perspective: each of which we shall explore and critique in this article. The first is founded on the dualist premise that human matter is in some ways essentially and qualitatively distinct from other matter. The second — which is in some ways a consequence, and in other ways a precondition, of the first — derives from the aggregations implied by terms such as 'human', 'humanity' and 'human rights'. Such terminology glosses over the sheer diversity and multiplicity of capacities of individual bodies and downplays the inequalities between human bodies in contemporary capitalist and neo-liberal societies.

<sup>23</sup> M Fleurbaey, S Kartha, S Bolwig et al, 'Sustainable development and equity' in O Edenhofer, R Pichs-Madruga, . Sokona et al (eds), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2014), 322.

<sup>24</sup> United Nations, n.22.

<sup>25</sup> Ibid, 1.

<sup>26</sup> Ibid, 14.

<sup>27</sup> Bernstein, S. (2000). Ideas, social structure and the compromise of liberal environmentalism. *European Journal of International Relations*, 6(4), 464–512, p. 471.

<sup>28</sup> Bernstein, S. (2001). *The Compromise of Liberal Environmentalism*. New York NY: Columbia University Press, p.3; Talshir, G. (2012). The role of environmentalism. In Y. Levy and M. Wissenburg (Eds.), *Liberal Democracy and Environmentalism. The End of Environmentalism?* (pp. 22–43). London: Routledge; Whitehead, M. (2014b). Sustainability. In C. Death (Ed.), *Critical Environmental Politics* (pp. 257–266). London: Routledge.

<sup>29</sup> Prudham, S. (2009). Pimping climate change: Richard Branson, global warming, and the performance of green capitalism". *Environment and Planning A*, 41(7), 1594–1613, p.1596.

To supply an ontological framing within which to unpack these two critiques fully, the following two sections explore how a posthumanist perspective opens up new understandings of environmental sustainability and of the diversity of posthuman capacities.

### 3 NEW MATERIALISM: FROM HUMANISM TO POSTHUMANISM

The dualism constructed between culture and nature supplied post-Enlightenment philosophers, scientists and social scientists with a neat way to set limits on the respective concerns of the social and natural sciences.<sup>30</sup> This dichotomy is seductive. At first sight, it seems fair to ascribe phenomena such as patterns of atmospheric pressure or the operation of living cells and organs to the ‘natural’ world and others such as industrialisation or sexuality to an alternative realm: the ‘social’ world. However, when the social sciences and humanities begin to explore embodiment, anthropogenic climate change, or the effects of the built environment on human well-being such a distinction is more problematic. It swiftly becomes clear that the natural and cultural are intertwined, and that culture/nature dualism imposes a false division in the understanding of these complex processes.<sup>31</sup> Social and natural scientists in fields as disparate as epigenetics, macroeconomics and environmental science are recognising a need to cut across these artificial distinctions and to work across disciplinary boundaries to formulate new questions and solutions.<sup>32</sup>

Nature/culture dualism in Western philosophy and social theory has also sidelined rival non-Western ontologies that treat humans as fully part of ‘environment’,<sup>33</sup> instead imposing Eurocentric and colonialist knowledge and ideological perspectives that have considered ‘nature’ to be an inferior domain to be exploited for human benefit.<sup>34</sup> Though the new materialisms are plural and disparate, with nuanced and sometimes major divergences between their advocates, they offer a contemporary means to acknowledge the insights to be drawn from these alternative ontologies by challenging essentialism (the assertion that an entity such as a table or a human has inherent attributes that define its identity and function) and anthropocentrism. Here, we shall explore these insights via the work of feminist materialist and posthumanist scholars Donna Haraway, Rosi Braidotti and Jane Bennett.<sup>35</sup>

Biologist and feminist theorist Donna Haraway has suggested that ‘culture’ has carved out its identity in opposition to ‘the natural’.<sup>36</sup> Such nature/culture dualism — she has argued —

<sup>30</sup> Barad, K. (1996). Meeting the universe halfway: Realism and social constructivism without contradiction. In Nelson, LH and Nelson, J (Eds.), *Feminism, Science and the Philosophy of Science* (pp. 161–194). Dordrecht: Kluwer, p. 181; Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p. 3; NJ Fox and P Alldred, ‘Sustainability, feminist posthumanism and the unusual capacities of (post)humans’ (2020) 6/2 *Environmental Sociology*, 121–31; Meloni, M. (2016). From boundary work to boundary object: How biology left and re-entered the social sciences”. *Sociological Review Monograph*, 64(1), 61–78.

<sup>31</sup> Latour, B. (1993). *We Have Never Been Modern*. Cambridge MA: Harvard University Press.

<sup>32</sup> Landecker, H., and Panofsky, A. (2013). From social structure to gene regulation, and back: A critical introduction to environmental epigenetics for sociology. *Annual Review of Sociology*, 39, 333–357; Meloni, M. (2014). How biology became social, and what it means for social theory. *The Sociological Review*, 62(3), 593–614.; Niewöhner, J. (2011). Epigenetics: Embedded bodies and the molecularisation of biography and milieu. *BioSocieties*, 6(3), 279–298, p.281.

<sup>33</sup> Todd, Z. (2016). An indigenous feminist’s take on the ontological turn: ‘Ontology’ is just another word for colonialism”. *Journal of Historical Sociology*, 29(1), 4–22.

<sup>34</sup> Braun, B. W. (1997). Buried epistemologies: The politics of nature in (post)colonial British Columbia. *Annals of the Association of American Geographers*, 87(1), 3–31; Sundberg, J. (2014). Decolonizing posthumanist geographies”. *Cultural Geographies*, 21(1), 33–47, p. 33.

<sup>35</sup> Apart from these authors, the following analysis of new materialist ontology also draws its inspiration from other materialist scholarship, including DeLanda, M. (2006). *A New Philosophy of Society*. London: Continuum; Deleuze, G., and Guattari, F. (1984). *Anti-Oedipus. Capitalism and Schizophrenia*. London: Athlone; Latour, B. (2005). *Reassembling the Social. An Introduction to Actor Network Theory*. Oxford : Oxford University Press; Thrift, N. (2008). *Non-representational Theory: Space, Politics, Affect*. London: Routledge.

<sup>36</sup> Haraway, D. (1992). Otherworldly conversations; terran topics; local terms”. *Science as Culture*, 3(1), 64–98, p.65.

is unfortunate and both theoretically and politically enfeebling, given the increasing and inevitable convergence of the organic and the inorganic in contemporary technological society.<sup>37</sup> Furthermore, nature/culture dualism is expressed and intensified in colonialism and racism, patriarchy and sexism, and in the capitalist appropriation of nature for human benefit.<sup>38</sup>

Haraway's feminist and materialist project has explored the proliferation of technologies and associated scientific perspectives that increasingly impinge upon human bodies, with the cultural trope of the 'cyborg' as her locating hook. Though cyborgs (a meld of flesh and technology) feature in *Terminator*-style science fiction, they are commonplace in the contemporary world — products of scientific and medical innovations that draw bodies into intimate proximity with inorganic matter: from joint replacements to genetically modified organisms and biotech.<sup>39</sup>

But, just as cyborgs challenge the nature/culture dualism, Haraway argues that entities labelled as 'apes' and 'women' also unsettle the 'evolutionary, technological and biological narratives' that have fostered distinctions between 'the natural' and 'the human'. As such, these transgressive entities provide opportunities to reveal the continuities between humans and the rest of the material universe.<sup>40</sup> Such transgressions, she suggests, have the potential to demolish the conventional distinction between nature and culture.<sup>41</sup>

Haraway's work is among the influences cited in Rosi Braidotti's development of a materialist, feminist and posthuman philosophy and ethics of environment,<sup>42</sup> in which she argues that the interests of humans cannot be divorced from the interests of other living things and of the Earth. Braidotti's work navigates a path between and beyond both humanism and anti-humanism within social theory and the humanities toward an emergent posthumanism.<sup>43</sup>

Humanism provided a post-Enlightenment anthropocentric challenge to religious authority by elevating secular human reason over all else including God;<sup>44</sup> its secularism supplying the foundations for social and political changes including the French revolution, first-wave feminism and the anti-slavery movement.<sup>45</sup> While Braidotti acknowledges that humanism has promoted issues solidarity, community-building and principles of social justice and equality,<sup>46</sup> she also notes that the 'human' who was the measure of all things in humanist doctrine turned out to be white, male, able-bodied and exploitative of all other life-forms.<sup>47</sup>

Anti-humanism rejected this anthropocentric focus, and — most recently in the shape of post-structuralist theory — presented an alternative to humanism that proclaimed the death of 'Man' to be an intrinsically progressive rupture.<sup>48</sup> Though sympathetic to this critique, Braidotti has argued that anti-humanism risks throwing out the progressive achievements of humanism concerning solidarity, social justice and equality,<sup>49</sup> while it would be an ironic act of humanist

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<sup>37</sup> Haraway, D. (1991). *Cyborgs, Simians and Women*. London: Free Association Books; Haraway, D. (1997). *Modest\_Witness@Second\_Millennium. Femaleman\_Meets\_Oncomouse*. London: Routledge.

<sup>38</sup> Haraway, D. (1991). *Cyborgs, Simians and Women*. London: Free Association Books, p.150.

<sup>39</sup> Klugman, C. M. (2001). From cyborg fiction to medical reality. *Literature and medicine*, 20(1), 39-54.

<sup>40</sup> Haraway, D. (1991). *Cyborgs, Simians and Women*. London: Free Association Books, p.154.

<sup>41</sup> Haraway, D. (1997). *Modest\_Witness@Second\_Millennium. Femaleman\_Meets\_Oncomouse*. London: Routledge, p.270.

<sup>42</sup> Braidotti, R. (2006b) *Transpositions: On nomadic ethics*. Cambridge: Polity, Braidotti, R. (2011). *Nomadic Theory*. New York NY: Columbia University Press; Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity; Braidotti, R. (2019). *Posthuman Knowledge*. Cambridge: Polity.

<sup>43</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.26.

<sup>44</sup> Carroll, J. (1993). *Humanism: The Wreck of Modern Culture*. London: Fontana, p.117.

<sup>45</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.32.

<sup>46</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.29.

<sup>47</sup> Braidotti, R. (2006a). Posthuman, all too human: Towards a new process ontology. *Theory Culture and Society*, 23(7-8), 197–208, p.200; Braidotti, R. (2011). *Nomadic Theory*. New York NY: Columbia University Press, pp.82, 88-89.

<sup>48</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.23.

<sup>49</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.29.

hubris for humans to assert the end of humanism.<sup>50</sup>

For Braidotti, the justification for overturning nature/culture dualism lies in the recognition, cognate with Haraway's, that the interests of humans are not divorced from the interests of other living things and of the physical environment. Moving beyond this humanism/anti-humanism duality, she instead establishes a 'posthuman' project in which matter and culture are not dialectically opposed. This understanding of the posthuman supplies Braidotti with the basis for an 'eco-philosophy' that establishes a continuum between human and non-human matter<sup>51</sup> and between human subjectivity and planetary ecology.<sup>52</sup> This eco-philosophy in turn constitutes a posthuman ethics based on a new sense of inter-connectedness between human and non-human; 'an affirmative bond that locates the subject in the flow of relations with multiple others'.<sup>53</sup>

The relational and materialist posthumanism in the work of Braidotti, Haraway and other new materialist scholars reflect the two features of a new materialist ontology noted earlier: anti-essentialism and post-anthropocentrism. On the first of these, new materialisms reject essentialist notions of entities such as bodies, animals and inanimate things as possessing pre-existing and fixed attributes.<sup>54</sup> Rather, these myriad materialities are relational, gaining form and continuity through their engagements with the other material relations with which they assemble, and through the emergent capacities or 'becomings' that these interactions co-generate.<sup>55</sup> Events and interactions are to be understood as *assemblages*:<sup>56</sup> arrangements or orderings<sup>57</sup> of relations (bodies, things, social institutions and constructs) that are inherently fluid and continually in flux.<sup>58</sup>

A new materialist perspective is post-anthropocentric in its displacement of humans as privileged elements within the global environment and of human agency as the prime mover of social production. The new materialisms treat all the disparate materialities in an assemblage as possessing capacities to *affect*, or to be affected by, other assembled relations.<sup>59</sup> New materialists such as Jane Bennett proclaim the liveliness and affectivity of all matter; a 'thing-power'<sup>60</sup> [60] — that is, a capacity to affect or be affected — associated with all materiality. In Bennett's view, human agency is consequently no more than a particular variety of thing-power: the product of a body's component materialities (bone, muscle, blood and so forth) rather than any unique motivation such as an active mind or soul.<sup>61</sup> In this posthuman eco-philosophy, nonhuman materialities are 'bona fide participants' rather than 'recalcitrant objects, social constructs, or

<sup>50</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.30.

<sup>51</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.104.

<sup>52</sup> Braidotti, R. (2006b) *Transpositions: On nomadic ethics*. Cambridge: Polity, p.41.

<sup>53</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p. 50, see also Conty, A. F. (2018). The politics of nature: New materialist responses to the Anthropocene. *Theory, Culture and Society*, 35(7–8), 73–96, p. 91; Cudworth, E., and Hobden, S. (2015). Liberation for Straw Dogs? Old materialism, new materialism, and the challenge of an emancipatory posthumanism'. *Globalizations*, 12(1), 134–148; Franklin, A. (2006). Burning cities: A posthumanist account of Australians and eucalypts. *Environment and Planning D: Society and Space*, 24(4), 555–576; Pickering, A. (2005). Asian eels and global warming: A posthumanist perspective on society and the environment. *Ethics and the Environment*, 10(2), 29–43, pp.33–35.

<sup>54</sup> Braidotti, R. (2011). *Nomadic Theory*. New York NY: Columbia University Press, p3.

<sup>55</sup> Deleuze, G. (1988). Spinoza: *Practical Philosophy*. San Francisco: City Lights, p.125; DeLanda, M. (2006). *A New Philosophy of Society*. London: Continuum, p.3.

<sup>56</sup> Bennett, J. (2005). The agency of assemblages and the North American blackout?. *Public Culture*, 17(3), 445–65, p.445; Pickering, A. (2005). Asian eels and global warming: A posthumanist perspective on society and the environment. *Ethics and the Environment*, 10(2), 29–43, p34.

<sup>57</sup> Buchanan, I. (2017). Assemblage theory, or, the future of an illusion'. *Deleuze Studies*, 11(3), 457–474, p.465.

<sup>58</sup> Deleuze, G. (1988). Spinoza: *Practical Philosophy*. San Francisco: City Lights, p.128; Lemke, T. (2015). New materialisms: Foucault and the 'government of things'". *Theory, Culture and Society*, 32(4), 3–25.

<sup>59</sup> Deleuze, G. (1988). Spinoza: *Practical Philosophy*. San Francisco: City Lights, p.101.

<sup>60</sup> Bennett, J. (2010). *Vibrant Matter*. London: Duke University Press, p.2.

<sup>61</sup> Bennett, J. (2010). *Vibrant Matter*. London: Duke University Press, p.10.

instrumentalities' within events and interactions.<sup>62</sup>

Furthermore, from this perspective, 'the environment' is no longer simply the context for human agency, but the arena for the production of the entirety of both 'natural' and 'social' worlds. 'Human' bodies (and other 'human' stuff such as thoughts, ideas, memories, aspirations and so forth which have capacities to materially affect), 'social' stuff such as organisations and social formations, and all the 'natural' stuff that comprises the physical environment are drawn together into a single assemblage.<sup>63</sup> The entirety of the natural and social world is the environment, with nothing beyond it, and nothing (for instance, humans and their diverse cultures) excluded from it.

Together, these aspects of new materialist ontology supply the starting-point for new ways of thinking about nature and culture, and — as we shall show later — for a new perspective upon sustainable development and responses to crises such as anthropogenic climate change. In place of an 'environmentalism' in which humans are stewards or protectors of 'the environment', posthuman bodies are intricately entangled within environment-assemblages. However, to complete this analysis of a posthuman perspective, we must first address the aggregations of bodies that terms such as 'human' and 'humanity' establish.

#### 4 POSTHUMANS, ENVIRONMENT AND ENVIRONMENTAL JUSTICE

The work of the materialist feminists that we have reviewed establishes a new posthuman eco-philosophy and ethics that affirms the commonalities and connectedness of all matter.<sup>64</sup> However, this posthuman position also challenges the sexualisation, racialisation and naturalisation of the West's Others<sup>65</sup> that has led to both the despoliation of the environment (including the current environmental crisis of climate change) and the inequalities between global North and South.<sup>66</sup> The category of 'human' and the concept of 'humanity' are revealed as part of a darker side to humanism, which obscures both the diversity and the inequalities between genders, races, incomes, abilities, nationalities and other stratifications.<sup>67</sup>

A posthuman ontology and ethics consequently incorporates a concern with social justice to challenge these inequities, while policies to address climate change must also address 'climate justice'.<sup>68</sup> To mark out this critical recognition of diversity and inequalities, from hereon we refer to 'posthumans', in place of the aggregating terms 'humans' and 'humanity'.<sup>69</sup> Rather than focusing upon humans as 'individuals' (literally: 'indivisible'), what we term a 'posthuman' is an assemblage of biological, sociocultural and environmental elements, whose capacities to affect and be affected are contingent upon its setting and emergent in its relations with other matter.<sup>70</sup>

<sup>62</sup> Bennett, J. (2010). *Vibrant Matter*. London: Duke University Press, p.62, see also Conty, A. F. (2018). The politics of nature: New materialist responses to the Anthropocene. *Theory, Culture and Society*, 35(7–8), 73–96; NJ Fox and P Alldred, 'Social structures, power and resistance in monist sociology:(New) materialist insights' (2018) 54/3. *Journal of Sociology*. 315–330..

<sup>63</sup> van der Tuin, I., and Dolphijn, R. (2010). The transversality of new materialism". *Women: A Cultural Review*, 21(2), 153–171.

<sup>64</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p.50.

<sup>65</sup> Haraway, D. (1991). *Cyborgs, Simians and Women*. London: Free Association Books, p.50.

<sup>66</sup> Baer, H. (2008). Global warming as a by-product of the capitalist treadmill of production and consumption-The need for an alternative global system. *The Australian Journal of Anthropology*, 19(1), 58.

<sup>67</sup> Braidotti, R. (2019). *Posthuman Knowledge*. Cambridge: Polity, p.159.

<sup>68</sup> Schlosberg, D., and Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice". *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359–374.

<sup>69</sup> NJ Fox and P Alldred, 'Sustainability, feminist posthumanism and the unusual capacities of (post)humans' (2020) 6/2 *Environmental Sociology*. 121–31, 124.

<sup>70</sup> Barad, K. (2001). Re)configuring space, time and matter. In Dekoven, M. (Ed.), *Feminist Locations* (pp. 75–109). New Brunswick, NJ: Rutgers University Press, p.96; DeLanda, M. (2006). *A New Philosophy of Society*. London: Continuum, p.10-11; NJ Fox and P Alldred, n. 69, 124.

This new materialist recognition that matter's capacities are always context-dependent requires acknowledgement of the unevenness of how posthumans' capacities manifest. Diverse capacities mean that some posthumans (predominantly those who are white, male, comparatively rich and from the global North) play a much greater part in using energy and resources and generating pollution than others<sup>71</sup> and have access to a range of resources not available to those from other contexts. This unevenness has consequences when it comes to assessing the impacts of environmental degradations on posthuman bodies. Two thirds of greenhouse emissions has been produced by rich white posthumans in the EU, US and Japan,<sup>72</sup> while much of the impact (such as flooding, drought, loss of biodiversity, land quality degradation) has been experienced — and will increasingly be felt — by poor posthumans in the global South.<sup>73</sup> Furthermore, environmental policies to counter the effects of anthropogenic climate change (such as switches to renewal energy sources and controls on rain forest clearances for agriculture, etc) might disproportionately affect the poorest posthumans and be far more onerous for them, increasing inequalities between rich and poor.<sup>74</sup>

The need to link social justice to environmental sustainability has been recognised in the 'environmental justice' and 'climate justice' movements.<sup>75</sup> A posthuman analysis of sustainable development weaves these two threads of justice and sustainability by emphasising the connectedness of human and non-human materialities, while acknowledging the diversity and multiplicity of posthumans. The 'posthuman politics'<sup>76</sup> addresses the mutual dependency of posthuman and non-human capacities. It evaluates any event (that is: a specific assemblage of human and non-human materialities) in terms of the breadth of possibilities it produces in its constituent relations.<sup>77</sup> Environmental policy, in this posthuman perspective, will aim to enhance the capacities of both non-human and posthuman. It will neither privilege the latter over the former (humanism) or the former over the latter (anti-humanism) (perspectives both represented in contemporary environmental politics) —nor privilege the capacities of rich, white, global North posthumans over others.

In the next section, we draw out the novel implications of this dual commitment to the diversity of matter and to posthuman multiplicity, focusing upon the harnessing of material capacities in policies to address climate change.

## 5 SUSTAINABILITY, POSTHUMANISM AND THE UNUSUAL CAPACITIES OF POSTHUMANS

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<sup>71</sup> Agyeman, J., and Evans, B. (2004). Just sustainability? The emerging discourse of environmental justice in Britain? *Geographical Journal*, 170(2), 155–164; Klinsky, S., Roberts, T., Huq, S., Okereke, C., Newell, P., Dauvergne, P. et al. (2017). Why equity is fundamental in climate change policy research. *Global Environmental Change*, 44, 170–173.

<sup>72</sup> Baer, P., Kartha, S., Athanasiou, T., and Kemp-Benedict, E. (2009). The greenhouse development rights framework: Drawing attention to inequality within nations in the global climate policy debate. *Development and Change*, 40(6), 1121–1138, p.1127.

<sup>73</sup> Schlosberg, D., and Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice". *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359–374, p.360; United Nations (UN) 2019. *The Sustainable Development Goals Report*. Geneva: United Nations, p.3.

<sup>74</sup> Taconet, N., Méjean, A., and Guiavarch, C. (2020). Influence of climate change impacts and mitigation costs on inequality between countries. *Climatic Change*, 160: 15–34, p.17.

<sup>75</sup> Schlosberg, D., and Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice". *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359–374, p.360-361

<sup>76</sup> Hobden, S. (2014). Posthumanism". In C. Death (Ed.), *Critical Environmental Politics* (pp. 175–183). London: Routledge, p. 182.

<sup>77</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p. 60. For a discussion of Deleuze's Spinozist and Nietzschean ethics of becoming, see Buchanan, I. (2017). Assemblage theory, or, the future of an illusion'. *Deleuze Studies*, 11(3), 457–474.

The posthumanist and new materialist ontology of environment that we have set out in the previous two sections undermine the anthropocentric perspective on environmental sustainability and sustainable development that has developed in high-level policy fora over the past forty years. Indeed, a new materialist ontology of flux and emergence must step back from any conception of sustainability as continuity. Most assemblages are not sustainable, and have within them contradictory forces that will lead them to fall apart or to transmogrify into something else in a day or an hour or a minute.<sup>78</sup> Indeed the universe, we are told, is not sustainable: at some time in the future it will either expand to infinity and slowly chill to near absolute zero, or collapse into a singularity; one day the Earth will fall into the sun and all its matter be utterly transformed.

Instead, this ontology establishes the foundations for an alternative understanding of sustainability as ‘ecological potential’, challenging a narrow model of sustainability tied to human lives and future human generations. This alternative view focuses not upon stable attributes and continuities of human or non-human matter, but upon the capacities and potentials of posthumans that emerge when assembled with other matter.<sup>79</sup> New materialist ontology moves beyond the usual narrow focus on human potential to acknowledge the capacity of all matter (non-human as well as human) to ‘become other’.<sup>80</sup> Sustainable development in this perspective should seek ways to enhance the capacities and ‘becomings’ of all elements of the planetary assemblage. These becomings include interactions between earth, air and water, and the nitrogen and water cycles of the physical environment; the productive life-courses of the diverse multiplicity of plants and wild animals, and opportunities for all posthumans to work, play and interact productively. Sustainability further requires that such becomings are enabled in ways that do not oppose human capacities to those of other materialities.

Such a posthuman perspective rejects the inherent humanism of liberal environmentalism,<sup>81</sup> the UN’s anthropocentric position on environmental sustainability, *and* the anti-humanism of some ‘radical environmentalism’ that regards opportunities to enhance human potential as foundationally inimical to ‘the environment’.<sup>82</sup> With humans no longer ontologically separate from the environment, but instead fully integral alongside other animate and inanimate elements, then an ethics of becoming<sup>83</sup> must apply to posthuman capacities and desires as much as to the becoming of the non-human. What counterposes such a recognition to an anthropocentric focus is that, within a sustainability grounded in ecological potential, possibilities for becoming are located within the broader concern with ecological possibility and biodiversity. What sustains ‘the environment’ can also be ‘emancipatory’ for posthumans.<sup>84</sup>

A posthuman perspective on sustainability as potential subtly shifts how we should consider the 17 goals for sustainable development agreed by world leaders at the United Nations summit in 2015, discussed above.<sup>85</sup> These objectives were articulated within a discourse that ties environmental sustainability to economic and human social development — indeed, that considers the latter to be a necessary precondition for the achievement of the former. While not rejecting the valid aspirations of the UN and other bodies to emancipate humans economically and socially, once humans are regarded as integral to the environment, this distinction dissolves.

<sup>78</sup> Deleuze, G., and Guattari, F. (1984). *Anti-Oedipus. Capitalism and Schizophrenia*. London: Athlone, p.5.

<sup>79</sup> Braidotti, R. (2011). *Nomadic Theory*. New York NY: Columbia University Press, p. 312-3; Parr, A. (2009). *Hijacking Sustainability*. Cambridge MA: MIT Press, p. 161.

<sup>80</sup> Guattari, F. (2000). *The Three Ecologies*. London: Athlone, p.20.

<sup>81</sup> Bernstein, S. (2001). *The Compromise of Liberal Environmentalism*. New York NY: Columbia University Press; Talshir, G. (2012). The role of environmentalism. In Y. Levy and M. Wissenburg (Eds.), *Liberal Democracy and Environmentalism. The End of Environmentalism?* (pp. 22–43). London: Routledge.

<sup>82</sup> Kowalik, M. (2018). The rise of anti-humanism. *Quadrant*, 62(5), 60–61.

<sup>83</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p. 100.

<sup>84</sup> Cudworth, E., and Hobden, S. (2015). Liberation for Straw Dogs? Old materialism, new materialism, and the challenge of an emancipatory posthumanism’. *Globalizations*, 12(1), 134–148, p. 144.

<sup>85</sup> United Nations, n. 22.

The posthuman commitment must be instead to promote those actions that can enhance the environment's (and hence human) potentialities, and to moderate actions that would limit that potential — be that by exhausting natural resources, filling the atmosphere with greenhouse gases, or by limiting human possibilities through poverty, economic inequities or threats to health.

To further unpack this posthuman perspective on sustainability as ecological potential, we turn once again to the feminist materialist scholars discussed earlier. The affectivity and emergent capacities of all matter<sup>86</sup> undermines both the humanist hubris that has led to exploitation of 'the environment' for human interests, and the anti-humanism of 'hard' environmentalism that considers human life to be inimical to Earth's ecology. Humans are not in charge of the 'irrepressible flows of encounters, interactions, affectivity and desire' that produce the world and everything in it.<sup>87</sup> These flows *are* the 'becoming' of the planet: the engine by which the global environment continually assembles, dis-assembles, transforms and becomes other. Posthumans may be an integral part of that becoming, but they are not its prime mover.

Bennett's analysis offers a means to operationalise a posthuman sustainable development policy. All matter possesses capacities that produce the becomings of the planet, be they geological, meteorological, biological, economic, cultural, emotional or psychological. An ethics of environmental sustainability can be founded on assessments of how actions enable or constrain environmental becoming. Enabling actions include reducing greenhouse gas emissions and plastic waste, or providing clean water to enhance human health. Constraining actions include exploiting natural resources such as heavy metals for economic gain, clearing forest for agriculture, or undercutting local food production with cheap imports that increase social and economic inequalities and injustices.

While this ethics may redress the ecological balance between human and non-human, the capacities of posthumans — as part of 'the environment' — must not, however, be side-lined or trampled upon. Bennett suggests that while posthumans should reduce their environmental impact, sometimes environmental becoming may need 'grander, more dramatic and violent expenditures of human energy'<sup>88</sup>. Building on this assessment, our next proposition is radical, perhaps even counter-intuitive. We would suggest that posthumans possess some unusual capacities. These include the capacity to attribute meaning to — or otherwise conceptualise — events; to act altruistically towards unknown others; to imagine the future and create technologies to deliver it; and to use reason to theorise, predict or anticipate future or unseen events.<sup>88</sup>

We would further suggest that these unusual capacities are now significant for addressing current environmental challenges. These capacities must not be denied or rejected simply to assert some kind of anti-humanist purism, but must be added to the mix, along with the material capacities of non-human elements of the environment.<sup>89</sup> The present climate change crisis will not only affect human existence but that of many millions of living organisms, many of which face extinction — with unknown consequences for a biosphere that has evolved over millions of years.<sup>90</sup> Anthropogenic de-stabilisations of ecologies can lead to catastrophic changes such as desertification or out-of-control greenhouse gas emissions,<sup>91</sup> which in a worst-case scenario

<sup>86</sup> Bennett, J. (2010). *Vibrant Matter*. London: Duke University Press, p.11.

<sup>87</sup> Braidotti, R. (2013). *The Posthuman*. Cambridge: Polity, p. 100.

<sup>88</sup> NJ Fox and P Alldred, n.69, 126, see also Schmidt, J. (2013). The empirical falsity of the human subject: New materialism, climate change and the shared critique of artifice". *Resilience*, 1(3), 174–192, p.189-190.

<sup>89</sup> Lorimer, J. (2015). *Wildlife in the Anthropocene. Conservation after Nature*. Minneapolis MN: University of Minnesota Press, p. 4.

<sup>90</sup> Thomas, C. D., Cameron, A., Green, R. E., Bakkenes, M., Beaumont, L. J., Collingham, Y. C. et al. (2004). Extinction risk from climate change. *Nature*, 427(6970), 145–148; Urban, M. C. (2015). Accelerating extinction risk from climate change. *Science*, 348(6234), 571–573.

<sup>91</sup> Scheffer, M., Carpenter, C., Foley, J. A., Folke, C., and Walker, B. (2001). Catastrophic shifts in ecosystems. *Nature*, 413(6856), 591–596.

could render Earth uninhabitable.

Evolutionary and geological time-scales are too slow to address the causes of anthropogenic climate change, such as conflicts between economic and environmental interests concerning continued fossil fuel extraction. In these circumstances, the physical capacities of non-human matter must be augmented with these unusual human capacities to predict, model and enact possible environmental, political and economic futures; to develop technologies that can reverse the effects of greenhouse gases; and to act altruistically to protect the non-human elements of the environment.

This acknowledgement does not mark a return to a humanist re-privileging of human agency or reason, however. A posthuman environmental ethos displaces posthumans from any kind of privileged status that elevates their aspirations or priorities over non-human elements of the environment. Instead, it fully recognises an environment that is endlessly emerging, changing, fragmenting and fracturing, opening up both human and non-human possibilities rather than closing them down. Together, these posthuman and non-human capacities can supply the means to enable the becomings of a vital, self-organising and emergent environment-assemblage. We develop this suggestion further in the concluding section, as we consider posthumans and climate change policy.

## 6 CLOSING REFLECTIONS: CLIMATE CHANGE POLICY AND POSTHUMAN'S CAPACITIES

In this article we have applied new materialist ontology and feminist posthumanist theories to establish a post-essentialist and post-anthropocentric perspective on sustainability and sustainable development. We critiqued the UN policy statements on sustainable development for their implicit anthropocentrism, which treats the Earth simply as a resource to be enjoyed by future generations of humans. In particular, we questioned the approach to sustainability that links environmental protection firmly to the social and economic development of human beings, while ignoring the detrimental effects that the latter has upon the former. In its place, we asserted a posthumanist understanding of sustainability as ecological potential, based on two propositions: the post-anthropocentric recognition of the relational vitality of all matter; and an ethics of environment that fosters matter's potential for becoming.

When considered in relation to policy on anthropogenic climate change, these two features of a posthumanist perspective can overcome shortcomings in current approaches.<sup>92</sup> On one hand, these two propositions broaden the conception of sustainable development beyond the humanist prioritisation of the well-being of current and future generations of humans,<sup>93</sup> instead acknowledging a need to assure the future potential of all matter, both 'animate' and 'inanimate'. On the other hand, this approach rejects anti-humanist arguments that to protect the environment, the human footprint on the Earth must be radically reduced,<sup>94</sup> regardless of the dire consequences of this policy for particular groups of posthumans such as the poor and those in the global South.<sup>95</sup> By treating humans as part of, rather than separate from 'the environment', and by establishing an ethics based on fostering all matter's potential for becoming, this posthumanist approach ties justice for both posthuman and non-human matter inextricably to environmental sustainability. At the same time, it focuses attention on the opportunities afforded by matter's capacities, including the unusual capacities of posthumans highlighted in the previous section. Amongst those unusual posthuman capacities are those to devise and implement policy.

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<sup>92</sup> Fox and Alldred, n.4.

<sup>93</sup> Cudworth, E., and Hobden, S. (2015). 'Liberation for Straw Dogs? Old materialism, new materialism, and the challenge of an emancipatory posthumanism'. *Globalizations*, 12(1), 134–148, p. 144-145.

<sup>94</sup> Bennett, J. (2010). *Vibrant Matter*. London: Duke University Press, p.121.

<sup>95</sup> Bosquet, M. (1977). *Capitalism in Crisis and Everyday Life*. Hassocks: Harvester Press, p. 185-186.

Conventionally, environmental policymaking weighs human economic interests against concerns for protecting the natural environment and mitigating climate change.<sup>96</sup> Such clashes might be played out at levels of global climate change meetings attended by the world's Heads of States, but they are also more locally contested. For example, the UK is exploring shale gas extraction as a way to lower prices and provide energy security, while Australia mines and exports large quantities of coal to China in order to benefit the Australian trade balance, even though continued use of fossil fuels runs counter to the global climate policy that these countries support. The affective interactions in this complex assemblage include the physical, biological and chemical processes that produced coal or gas deposits in the first place and subsequently allow it to be used as a fuel to generate electricity and carbon dioxide. Affects between fossil fuel, money, mining, machinery, and miners turn a subterranean mineral millions of years old into a product to be sold commercially, and at the same time provide work and wages to local people. Planners and elected representatives, planning laws and procedures, the public, political parties and governments interact to produce planning decisions. Public opinion for and against industrial developments fuels protests and counter-protests. Together these affects interact, conflict, antagonise and coalesce in ever-changing ways.

A posthuman approach cuts across the opposition of human/environment that informs the poles of this debate. Instead, issues of sustainable development require analysis of a simultaneously geological, geographical, cultural, social and affective assemblage, in which minerals, wind, air, trees, wildlife, humans and their technologies are among the many constitutive relations. Within an environment in which human and non-human are inextricably linked, sustainable development cannot be considered as a balancing act between 'environmental' and 'human' concerns. Understanding the environment as *incorporating* posthumans as an integral component means that posthuman and non-human matters are inextricably entangled in a complex affective flow. 'Sustainable development' requires fostering processes of becoming that open up both posthuman and non-human possibilities, rather than closing down one to benefit the other. A materialist framework based on an ontology of relations, assemblages and economies of affect requires attention to the complexities and contradictions that emerge whenever application of such policies and initiatives is sought, from the level of global policy down to the local planning committee adjudicating on the proposals for the natural and built environment.

Elsewhere, we have assessed four contemporary approaches within climate change policy: liberal environmentalism; the UN approach (outlined earlier); 'green capitalism', and no-growth economics.<sup>97</sup> We found that all four approaches fail to fully engage with the complex interactions between non-human and (post)human matter that produce anthropogenic climate change, in part because of their foundational humanist or anti-humanist commitments. We would argue here that the posthumanist perspective on sustainable development that we have set out supplies a way beyond these policy shortcomings.

In contrast to humanist privileging of human socioeconomic well-being, policies need to enact radical and comprehensive action to address the depredations of humanity: from the industrialisation of production, the consequent consumption of resources, and the damage caused by waste products. This addressal must include acknowledgement that a market economy

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<sup>96</sup> Fox and Alldred, n.3, 39.

<sup>97</sup> Fox and Alldred, n.4. 'Green capitalism' asserts that competition and the market economy can be the means to replace human practices that have led to climate change with technologies that can limit greenhouse gas emissions or sequester atmospheric carbon dioxide. See Prudham, S. (2009). Pimping climate change: Richard Branson, global warming, and the performance of green capitalism". *Environment and Planning A*, 41(7), 1594–1613; Zysman J and Huberty M (2014) *Can Green Sustain Growth? From the Religion to the Reality of Sustainable Prosperity*. Stanford University Press. No-growth approaches recognise the environmental harm that capitalism's endless search for growth and profit brings, and aim to replace this with a 'steady-state' economy, possibly also signalling a move from capitalism to eco-socialism. See Baer, H.A. (2018). *Democratic eco-socialism as a real utopia: Transitioning to an alternative world system*. New York NY: Berghahn Books.

— with its primary objective of profit and its secondary objective of growth — is the driver of the industrialisation that has led to climate change and environmental destruction.<sup>98</sup> This view challenges a discourse that simplistically links environmental protection with economic development, replacing it with a much more nuanced recognition of the diversity of posthumans and the need to overcome inequalities between posthumans produced by a range of class, gender, race and geographic intersectionalities. Furthermore, this new materialist, posthumanist approach entails a new ethics of environment in which *all* matter is recognised as relationally vital, and is assured opportunities for becoming. This includes extending the opportunities currently enjoyed by rich, white, global North posthumans both to other posthumans and to other ‘animate’ and ‘inanimate’ matter.

At the same time, the posthumanist perspective acknowledges the contributions that posthuman ingenuity and other unusual capacities make to the material environment as resources for countering anthropogenic climate change. These capacities (for instance, the ability to model climate change futures, to develop green technologies, and to act altruistically toward non-human matter) provide the basis upon which to manage down growth and competition; to implement the social and political transformations to enable this economic shift; to redistribute wealth among posthumans; and to end the human exploitation of non-human matter as resources.

Together, these interventions can provide the foundation for a policy of incremental actions — some very local, others national or global in scale — that address the breadth of natural, biological, social economic and political affects within the climate change assemblage. These interventions are not a ‘pick and mix’ selection of policy initiatives, but a mutually interdependent skein of actions that together can articulate successfully with the complexity of climate change. Furthermore, this is a long-term and global programme that depends for its success on political will, incisive leadership and collaboration across stakeholder groups.

To conclude: a posthumanist and new materialist ontology of an environment that fully incorporates posthumans can establish a research and action agenda to counter anthropogenic climate change. Practically speaking, this means designing and undertaking research that is capable of exploring the constellations of relations and socio-material interactions that comprise ‘the environment’. In terms of active engagement, it entails translating research findings into a posthuman ecology of becoming. This latter must address both policy development and (inter)governmental negotiations on sustainable development, and the affects and interactions of daily life that can foster ecological capacities and potentialities and thereby succour a posthuman ethics of planetary becoming. Local action can remain local, or it can be scaled: to a city, a nation and a planet.

A posthumanist perspective on sustainable development does not mean stepping back from ‘the environment’ but integrating fully within it. It is founded on the post-anthropocentric replacement of human privileging with a recognition of the relational vitality of all matter; and an ethics of environment that focuses on matter’s potential for becoming, including fully utilising the unusual capacities of all posthumans. Given where we are now (a planet already substantively degraded by anthropogenic pollution and the effects of burning carbon fuels), action is urgent and must be radical. Though it may seem paradoxical — given the state to which anthropogenic climate change has brought us — a substantive investment of posthumans’ unusual capacities is now required to overcome this global crisis.

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<sup>98</sup> NJ Fox and P Alldred ‘Climate change, economics and the policy-assemblage: Four policies and a materialist synthesis.’ *Globalizations*. (2020). DOI: 10.1080/14747731.2020.1807857