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Supervisor: Steven Malby

DISSERTATION

The Nexus of Climate Action and Human Rights, with a Focus on Sustainable Energy Transitions

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Chapter 1: Introduction, Concepts and Topic

Introduction

Climate change has been recognised as a "common concern of humankind"[1] – a phenomenon that will affect every state and person. In its Fifth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) "unequivocally confirmed that climate change is real and that human-made greenhouse gas emissions are its primary cause."[2]. The effects of climate change will unfold throughout the 21st century and are already being felt in many parts of the world. Continuing along the path that we have taken to arrive at this point will result in far-reaching grievous consequences for large swathes of the world's population. The impacts of climate change are predicted to include: "increased severe weather events both in terms of severity and frequency, water scarcity, food scarcity, desertification, increased wildfires, sea level rise due to melting glaciers and thermal expansion of oceans, ocean acidification, and its consequent impact on small island states, displacement due to climate change both internally and across borders, and potential conflicts over natural resources."[3] The IPCC predicts with high confidence that projected trends in global warming will increase the number of people suffering death, disease, hunger, malnutrition, and injury from heat waves, floods, storms, fires, and droughts and without improved protection coastal flooding could grow tenfold by the 2080s, affecting more than 100 million people annually.[4] Undoubtedly, the worst impacts of climate change will be felt by the most vulnerable groups in society, such as those living in poverty, indigenous peoples and women[5], and by developing states who historically have contributed the least to global greenhouse gas (GHG) emissions.[6]

[1] UNFCCC (1992), Preamble, Para 1
[2] "Human Rights and Climate Change". *OHCHR.*
[3] Atapattu and Schapper. "From UNFCCC to Paris Agreement: A Human Rights Assessment" in "Human Rights and The Environment: Key Issues" (2019). Ch. 9, 208.
[4] Knox. "Climate Change and Human Rights Law" (2009). *Virginia Journal of International* Law, 50(1), 165
[5] Elliot and Cook. "Climate Justice and the Use of Human Rights Law in Reducing Greenhouse Gas Emissions." (2016). *Quaker United Nations Office,* 6-7
[6] Ibid, 6. Note: While historically emissions have come primarily from developed countries, there is a section of rapidly industrializing developing countries that have also become responsible for huge emissions such as China, India and Brazil. Emissions per capita remain highest in developed countries, but total emissions by developing countries overtook developed states in the early 21st century.

The scale of the potential human rights impacts of climate change are astounding. Up to an additional 600 million people could face hunger by 2080 due to climate change.[7] Even if the global temperature rises no more than 2°C, one in seven people in the world will face a severe reduction in water resources.[8] Between 2008 and 2015, 157.8 million people were forced from their homes in the past seven years as a result of extreme weather.[9] It is also estimated that between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year, from malnutrition, malaria, diarrhoea and heat stress.[10]

As a threat to global security and prosperity, climate change has a multitude of effects on the protection and fulfilment of human rights. Some are direct effects such as in the case of damage caused by rising sea levels, extreme weather events and natural disasters brought about by climate change.[11] Others are more indirect ripple effects or slow onset effects such as in terms of the right to health caused by deteriorating underlying social and environmental determinants of health and increases in food, water and vector-borne diseases,[12] or violations of the rights of indigenous peoples through state responses to climate change that would affect indigenous lands, livelihoods and way of life.[13] Former UN High Commissioner for Human Rights Mary Robinson has called climate change the "greatest threat to human rights in twenty-first century".[14] As a result, the consequences of unmitigated climate change cannot be underestimated and states must act quickly to both minimize the potential catastrophic effects of climate change while also preparing societies to become more resilient in the face of a harsh new climate reality.

A joint statement by human rights NGO Amnesty International and environmental NGO Greenpeace in the lead-up to the 21st Conference of Parties (COP) to the UN Framework Convention

[7] Greenpeace and Amnesty International. "Joint Statement: Protection of human rights from climate change requires urgent shift to 100% renewable energy for all." (2015).
[8] Ibid
[9] Ibid
[10] "Climate Change and Health" (2018). *World Health Organization.*
[11] Lanyi. "Human Rights and Climate Change: An Unlikely Relationship?" (2012). *Alternative Law Journal* 37(4), 269
[12] Hesselman and Toebes. "The Human Right to Health and Climate Change: A Legal Perspective" (2015). *Global Health Law Groningen Research Paper,* 1.
[13] See: Scott and Smith. "Sacrifice Zones in the New Green Economy: The 'New' Climate Refugees" (2017). *Transnational Law and Contemporary Problems* 26(2), 371-382.
[14] UN Human Rights Council. "Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment". (2016). UN Doc A/HRC/31/52, Para 23.

on Climate Change (UNFCCC) in Paris stressed the imminent danger to human rights as well as the urgent need for a sustainable energy transition, away from fossil fuel use toward a 100% renewable energy future by 2050, in order to protect human rights from the devastating effects of climate change.[15] Renewable energy has a key role to play in the fight against climate change as "the main human activity that emits CO2 is the combustion of fossil fuels for energy".[16] As a result, transitioning away from fossil fuel use and the harmful GHG emissions that come with it, toward utilising cleaner, low-emission renewable energy sources becomes a matter of paramount importance and urgency.

Thesis and Roadmap

The international climate regime and human rights regime has not historically seen much integration with one another, but recent trends, especially the adoption of the 2015 Paris Agreement which contains specific mentions of human rights, provides an opportunity for mutual reinforcement and synergies. Climate change will inherently have human rights impacts and similarly, the fight against climate change, including the transition toward adopting a renewable energy future, must take into full consideration the protection of human rights. This paper seeks to contribute to the developing understanding of the nexus between climate action and human rights, especially focusing on sustainable energy transitions as a potent means of combatting climate change. There are thus two research questions that this essay considers. Firstly, **what is the nexus between climate mitigation and human rights?** This question requires a deeper understanding of the effects of climate change on substantive human rights and why climate change mitigation, of which an energy transition is a key strategy, is imperative. It will also consider the legal obligations stemming from both international human rights law and the international climate regime in order to identify potential areas of harmonization in order to protect human rights. The second question asks **how does the sustainable energy transition interact with human rights obligations?** While the energy transition is necessary for the long-term protection and enjoyment of human rights, the transition process must also be mindful of human rights and not lead to further violations.

[15] Greenpeace and Amnesty International. "Joint Statement: Protection of human rights from climate change requires urgent shift to 100% renewable energy for all." (2015).
[16] Steg, Perlaviciute and van der Werff. "Understanding the Human Dimensions of a Sustainable Energy Transition". (2015). *Frontiers in Psychology* 6(805), 2.

The importance of climate change as a developing field of study within the human rights framework cannot be stressed enough. As mentioned before, climate change represents a global threat to security, prosperity and human rights. As a result, efforts to combat the effects of climate change require greater attention from the human rights community. The linkages between energy and human rights as it stands are wholly underdeveloped. Energy was integrated into the development and poverty eradication framework with the adoption of the Sustainable Development Goals (SDGs) in 2015, nearly 30 years after the Brundtland Report which first coined the concept of sustainable development. The Brundtland report recognised that it would be unsustainable for developing nations to adopt the same energy path that developed nations have pursued in the past, and that states would have to seek ways to develop without major reliance on fossil fuels (known as "energy leapfrogging").[17] As energy becomes central to discussions of climate mitigation as well as sustainable development, discussions regarding the human rights impacts and benefits of the sustainable energy transition and a renewable energy future can be considered timely and can contribute to greater understanding of the harmonization required between the climate regime and human rights law.

The rest of this chapter will focus on explaining a few key concepts central to the understanding of the discussion in the rest of the paper. Chapter 2 will focus on the legal framework of the two regimes considered in this paper. It will discuss the normative substance of some of the substantive rights considered, as well as a brief overview of relevant international human rights law concepts. It will also provide some background to the key developments in the international climate regime, presenting an overview of where the current climate regime legal framework stands following the 2015 Paris Agreement. Chapter 3 considers the nexus of climate action and human rights, including the current synergies between the two regimes. Central to this will be an understanding of the obligations stemming from both Paris as well as relevant human rights obligations and avenues for mutual reinforcement and complementarity. Chapter 4 looks at the sustainable energy transition: what it is, what it encompasses and what are its effects on various individual human rights, including the right to health and the right to housing. Chapter 5 will elaborate this discussion by talking about more cross-cutting issues such as gender, equity between developed and developing states and extractive economies and finally

[17] Bradbrook. "Sustainable Energy Law: The Past and the Future". (2012). *Journal of Energy and Natural Resources Law* 30(4), 512.

conclude the essay by summarizing the key messages of the paper as well as contemplating future avenues of integration.

Key Concepts and Definitions

Before moving further, a few key concepts used throughout this paper must be defined. The first of which is **Climate Action**. Climate Action is included in the 2030 SDG Agenda as Goal 13 and put simply is actions taken to combat climate change and its impacts. Its targets within the SDG framework include strengthening resilience and adaptive capacity to climate-related hazards, integrating climate change measures into national policies, improving education and capacity on climate change, mobilizing finance to support the needs of developing countries in combatting climate change and promoting mechanisms for raising capacity of Least Developed Countries (LDCs) and Small Island Developing States (SIDS) for effective climate change planning.[18] For the purposes of this essay, climate action will refer to actions taken by states, both nationally and internationally, to combat climate change.

Climate Justice is a framework for linking human rights, development and principles of justice and equity to "achieve a people-centred approach to the climate crisis safeguarding the rights of the most vulnerable and sharing the burdens and benefits of climate change […] equitably and fairly."[19] Climate justice seeks to inform the discourse on rising GHG emissions and climate change into a rights-based movement to protect those at the frontline of climate change. As mentioned before, historically speaking, the developed countries who have contributed the least to climate change will fact the greatest impacts while lacking the resources and capacity to adapt to a bleaker climate reality. Paradoxically, these countries need to develop to face the challenge, which in our current carbon-based economy means greater fossil fuel use and greater GHG emissions.[20] This is the problem climate justice seeks to inform – how can we equitably ensure human rights and sustainable development in developing states while also effectively combatting climate change.

[18] UN General Assembly. "Transforming our world: the 2030 Agenda for Sustainable Development" (2015). UN Doc A/RES/70/1, 23

[19] Alam, Bhatia and Mawby. "Women and Climate Change: Impact and Agency in Human Rights, Security, and Economic Development" (2015). *Georgetown Institute for Women, Peace and Security*, 12.

[20] Humphreys. "Climate Justice – The Claim of the Past" (2014). *Journal of Human Rights and the Environment,* 5, 135-136

The **Sustainable Energy Transition** is a central topic of this thesis but what does it actually mean? While this paper will go into greater detail on what the sustainable energy transition encompasses, it is worth defining briefly here for clarity. The most basic definition would be a substitution of technologies and associated fuel inputs across the full set of energy subsectors and consumption, from technologies that emit substantial volumes of GHGs to technologies with limited or zero emissions.[21] In layman's terms, this refers to the phasing out of fossil fuels in both energy production and consumption and the large-scale adoption of renewable energy sources. As will be displayed later, there are several issues with this transition including in implementation in a manner that protects human rights, as well as issues with emissions along supply chains and in implementation that make certain renewable energy practices not as clean as one would believe.

Transitioning to cleaner energy is an important aspect of **Mitigation**, one of the key pillars of the international climate regime. Mitigation refers to efforts to lower emissions and reducing current concentration of CO2 from the atmosphere by enhancing carbon sinks (such as forests).[22] Examples of this could be protecting and increasing the size of forests, using electric cars and of course, using renewable energy for energy production. This is different to **Adaptation**, which refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts in order to moderate potential damages or benefit from opportunities associated with climate change.[23] This essay deals primarily with mitigation, but both mitigation and adaptation make up fundamental pillars of the international climate regime.

Lastly, we must consider **Climate Finance**, which is another central piece of the international climate change architecture. Climate finance refers to local, national or transnational financing—drawn from public, private and alternative sources of financing—that seeks to support mitigation and adaptation actions.[24] One of the objectives of the Paris Agreement is outlined as "making finance flows consistent with a pathway toward low GHG emissions and climate-resilient development"[25] and Article 9 of the Paris Agreement sets out relevant obligations regarding climate finance. Historically, climate finance had been limited to public financial flows from developed to developing country parties but the

[21] Arent, Arndt, Miller, Tarp and Zinamen. "Introduction and Synthesis" in "The Political Economy of Clean Energy Transitions" (2017), Ch.1, 3
[22] "Introduction to Mitigation" *UNFCCC.*
[23] "What do adaptation to climate change and climate resilience mean?" *UNFCCC.*
[24] "Introduction to Climate Finance" *UNFCCC*.
[25] Paris Agreement (2015), Art 2.1(c)

Paris Agreement adds the concept of the mobilization of climate finance as a global effort, which includes leveraging private financial flows by public interventions to address the needs of developing countries and efforts taken by all parties to channel public financial resources and leverage private finance domestically.[26]

An understanding of the central concepts of the international climate regime is necessary to analyse the ways in which it interacts with human rights, and the concepts described above will all be elaborated on throughout this paper. The next chapter focuses on the legal framework of both the climate regime and the normative frameworks of the individual human rights considered as affected by climate mitigation and sustainable energy transitions.

[26] Gastelumendi and Gnittke. "Climate Finance (Article 9)" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 14, 239

Chapter 2: Normative Legal Framework

Before moving into the analysis of the nexus between climate action and human rights and analysing how sustainable energy transitions interact with human rights norms, it is important to elaborate on the normative legal framework of both the international climate regime and human rights law. This chapter will provide a deeper understanding of the three main documents under the climate regime: the UNFCCC, the Kyoto Protocol and finally the 2015 Paris Agreement. It will talk briefly about the development of the international climate change architecture, and the progressive development of states' obligations under it, as well as unique features of the framework such as the Common but Differentiated Responsibilities principle (CBDR). A brief discussion of the norms and obligations of the various relevant substantive human rights will follow, namely the right to health, the right to housing, the right to work, the right to benefit from scientific progress, and the rights of indigenous peoples. As we will see later, the latter two have key roles in ensuring that mitigation actions and a sustainable energy transition do not end up causing further human rights violations. The chapter will end with an outline of the procedural guarantees afforded to the victims of human rights violations, and how these can be used to reinforce climate action.

The International Climate Regime

Climate Change entered the international political conscience in the 1970s during the first UN Conference on the Human Environment, the 1972 Stockholm Conference. "Climate science developed into a core input to political decision-making in 1988 when governments created the IPCC on the recommendation of the UN Environment Programme (UNEP) and the World Meteorological Organization (WMO)."[27] Climate change was accepted as a major global concern in 1992, with the adoption of the UNFCCC by 166 governments, with the goal to stabilize GHG emissions "at a level that would prevent dangerous anthropogenic interference with the climate system".[28] "It set the broad framework for further action, including establishing an institutional framework and some broad objectives and commitments."[29] Since 1995 with the first COP in Berlin, governments have been

[27] Ivanova "Politics, Economics and Society" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 1.B, 17.
[28] Ibid.
[29] Atapattu and Schapper (n3), 205

assembling annually to coordinate action in abating climate change. In 1997 at COP 3, governments agreed to the Kyoto Protocol which set emission reduction targets for developed countries only.[30] This was the first step in imposing binding obligations on state parties regarding climate action.[31] Neither the UNFCCC nor the Kyoto Protocol carried any mention of human rights, and any focus on vulnerability in Kyoto was in relation to states, not individuals or groups.[32]

The low point of the international climate regime came in Copenhagen in 2009, where at COP 15 no legally binding agreement could be reached.[33] The Copenhagen Accord, a document that delegations at COP 15 agreed to "take note of" instead of adopting[34], is the first mention in a (soft) legal text of what the limit that constitutes "dangerous anthropogenic interference" looks like.[35] The limit of 2°C had been agreed on by scientists for a while, and only six years later in Paris was this entered into a legally binding setting. In fact, the Paris Agreement displayed its level of ambition by also obligating states to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.[36] This ambition did not emerge out of nowhere in those six years between Copenhagen and Paris. As Ivanova states, climate action has "opened opportunities to imagine a new, low carbon economy and a new, resilient society" and in those six years the political context shifted from a focus on obstacles and a "desire to impede progress" to a focus on opportunity and commitment to facilitate it".[37] While the political will has translated to greater rhetorical ambition, how have the actual obligations and principles evolved within the three core documents?

UNFCCC

The UNFCCC, adopted in 1992, is the founding treaty of the international climate change regime. It entered into force in early 1994 and now enjoys near universal membership with 197 state parties.[38] As mentioned before, the UNFCCC set the framework for further coordinated action and establish the core parameters that would guide international climate action in the following decades. It established an

[30] Ivanova (n27), 17
[31] Atapattu and Schapper (n3), 205
[32] Ibid, 208
[33] Ivanova (n27), 17
[34] Werksman. ""Taking Note" of the Copenhagen Accord: What It Means" (2009) *World Resources Institute*
[35] Atapattu and Schapper (n3), 207
[36] Paris Agreement (2015), Art 2.1(a)
[37] Ivanova (n27), 22.
[38] Depledge. "The Legal and Policy Framework of the United Nations Climate Change Regime" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 2.A, 28

"ultimate objective", both for itself and "any related legal instruments" and specified that parties to the treaty should be guided by, amongst other things, "equity" and CBDR.[39] Both these principles have been the matter of controversy and debate.

At this point it is worth noting what CBDR actually is. The CBDR principle is rooted in equity and fairness and considers the disparities in power and capacity in the international arena. "The CBDR takes this disparity into account both in relation to the contribution to creating environmental problems and the ability to address them."[40] The three fundamental distinctions between developed and developing countries reflected in the regime are: different historical responsibility and different relative contributions to climate change; differing likely impacts of climate change, with certain poorer countries being more vulnerable than many others; and different capacities to contribute to global mitigation and national adaptation efforts.[41] The premise of such is that leadership from developed countries in climate action and differential treatment of developing countries is the equitable and appropriate basis for the structure of the international response to climate change.[42] As a result, "the UNFCCC incorporates the CBDR as a principle that underlies the legal regime."[43]

The UNFCCC created this differentiation through the Annex based categorization, where developed countries were named in a list, enclosed in its Annex I. These Annex I countries were required to take leadership by committing to provide financial resources and promoting, facilitating and financing the transfer of technology to developing countries.[44] In addition, the Annex I parties were subject to an obligation to "aim" as a group ("individually or jointly") to return their emissions to 1990 levels by the year 2000. This collective aim was duly met with the collective emissions of the Annex I parties were more than 6% below their 1990 levels by 2000.[45] The UNFCCC also set up reporting obligations (similarly differentiated) and initiated the annual sessions of the COP, setting in motion a continuous negotiation process to build upon the framework of the UNFCCC to progressively develop the international climate regime.[46]

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[39] Ibid.
[40] Atapattu and Schapper (n3), 206
[41] McInernay-Lankford, Darrow and Rajamani. "Human Rights and Climate Change: A Review of the International Legal Dimensions" (2011), *World Bank Study*, 49
[42] Rajamani and Guerin. "Central Concepts in the Paris Agreement and How they Evolved" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 4, 81
[43] Atapattu and Schapper (n3), 206
[44] Depledge (n38), 29
[45] Ibid, 30.
[46] Ibid, 30-32.

The Kyoto Protocol

The Kyoto Protocol was adopted in December 1997 and brought forth binding obligations and quantified emission targets for Annex I parties.[47] A compliance mechanism was defined to back up the commitments.[48] It broke new ground by introducing market mechanisms as central instruments for implementation, setting up schemes for international emissions trading and engaged non-Annex I parties on a voluntary basis through the Clean Development Mechanism (CDM),[49] although there have been various human rights issues regarding project implementation through the CDM as will be discussed later. The emissions trading scheme also turned "carbon into a commodity" which has created its own problems.[50] The Kyoto Protocol required the Annex I parties to reduce their overall emissions by at least 5% below 1990 levels in the commitment period of 2008-2012.[51] At COP 18 in 2012, the Doha Amendment was adopted which increased the reduction target to 18% from the group from 1990 levels in the 2013-2020 commitment period, however the coverage of Doha was less than that of Kyoto as several Annex I parties declined to take on the second commitment period.[52]

However, while the Kyoto Protocol outlined the grave nature of the threat and set up multiple mechanisms to work toward climate mitigation, the goals enshrined under Kyoto were insufficient to address the problem. The modest emission targets set in Kyoto were "grossly insufficient" and "some scholars even argue that they set back the solution process by decades".[53] Overall, the Kyoto Protocol has been ineffective in reducing the increased concentration of atmospheric GHG.[54] That being said, Kyoto remains an important manifestation of developed country leadership and it is unlikely that the strengthening of commitments in the Paris Agreement would have got underway without it.[55]

[47] Ibid, 33
[48] Ibid.
[49] Ibid, 33-34
[50] Scott and Smith. "Sacrifice Zones in the Green Energy Economy: The New Climate Refugees" (2017). *Transnational Law and Contemporary Problems,* 26(2), 374-375
[51] McInernay-Lankford et al. (n41), 50
[52] Depledge (n38), 34.
[53] Ivanova (n27), 20
[54] Boyle. "Climate Change, The Paris Agreement and Human Rights" (2018). *International & Comparative Law Quarterly*, 67(4), 760.
[55] Depledge (n38), 35

The Paris Agreement

The adoption of the Paris Agreement in 2015 was hailed as a breakthrough and it renewed optimism around international climate action. It set out a new agenda for implementing climate action and sustainable development post-Kyoto. One of its most significant features lies in its intended objective - to hold global temperature increases to 'well below' 2 °C and if possible, below 1.5 °C.[56] It achieves this objective principally by committing all States parties to "prepare, communicate and maintain" successive nationally determined contributions (NDCs) to reducing greenhouse gas emissions.[57] These NDCs are basically individual parties' climate action plans and although they are not formally part of the treaty beyond references to them, they are housed by the UNFCCC Secretariat.[58] Even though the NDCs are voluntary, certain binding obligations flow from them as Paris is a hybrid document encompassing both voluntary commitments and binding obligations.[59] The NDCs can be changed unilaterally by the State party at any time but this is subject to some conditions, namely that adjustments should **enhance the level of ambition** and developed countries are expected to maintain economy-wide absolute emission reductions while developing countries are expected to move toward economy-wide reduction targets over time.[60]

The Kyoto approach was largely a failure, especially by the time it came around to the second commitment period. Many developed countries backed out and removed themselves from the Kyoto process. At the same time, many developing countries exempt from Kyoto targets grew significantly, accompanied by a growth in their GHG emissions. The Paris outcome took a different approach, based on the idea that voluntary commitments are more likely to be met than those imposed through collective negotiations by the global community.[61] In addition, the Annex-based differentiation had always been a point of contestation and could be considered outdated. Developed states must still take the lead, but developing states are no longer exempt from making any emissions reductions, as they were under Kyoto. Although exemption may have been an understandable policy choice in the 1990s, by 2012

[56] Paris Agreement (2015), Art 2.1(a)
[57] Boyle (n54), 763
[58] Bodle and Oberthür. "Legal Form of the Paris Agreement and Nature of its Obligations" in Klein et al. (eds). "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch.5, 93
[59] Atapattu and Schapper (n3), 216
[60] Bodle and Oberthür (n58), 94
[61] Doelle. "Assessment of Strengths and Weaknesses" in Klein et al. (eds). "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch.22, 376

China was the world's biggest GHG emitter and India the third.[62] To tackle climate change, these countries had to be brought into the emission reduction regime.

Paris thus had to take steps to refine CBDR. It established certain core obligations for all parties in action "toward the purpose, on mitigation, adaptation, means of implementation and transparency".[63] Under Paris, **all** parties are expected to 'prepare' some level of contribution to ensuring that greenhouse gas emissions peak as soon as possible and thereafter reduce rapidly. The understanding is that reductions are to increase progressively, insofar as national circumstances allow, based on equity, and in the context of sustainable development and efforts to eradicate poverty.[64] The Agreement also recognises the special circumstances of SIDS and LDCs in the context of NDCs, financial support and capacity building.[65]

While a detailed analysis of the obligations of the Paris Agreement cannot be fit into this paper, it is worth looking at what it says on the topic of mitigation closely. Later chapters will also address its integration (or lack thereof, according to some) of human rights and energy. The provisions on mitigation, in Article 4 of the Agreement, opens with the long-term goal for mitigation which is the peaking of emissions "as soon as possible", and to take rapid reductions thereafter with "best available science", recognising peaking would take longer for developing countries and framing the goal with several key principles including "equity", "sustainable development" and the "eradication of poverty".[66] The mitigation NDCs are differentiated "in light of different national circumstances" but there is a legal expectation that they must reflect the country's highest possible ambition. They must also be submitted every five years, making mandatory informational requirements to track progress in implementing and achieving NDCs.[67] Article 4.2 not only creates the mandatory obligation to prepare and communicate NDCs but also obliges states to pursue domestic mitigation measures to achieve the objectives of their NDCs. Article 4.3 demands that each successive NDC submitted by a state party should "represent a progression beyond" the previous.[68] Progression is an important facet of the climate response as noted by its presence throughout the Paris framework. Art 4.4 which differentiates mitigation for developed

[62] Boyle (n54), 764
[63] Bodle and Oberthür (n58), 97
[64] Boyle (n54), 764
[65] Bodle and Oberthür (n58), 97
[66] Paris Agreement (2015), Art 4.1
[67] Winkler. "Mitigation (Article 4)" in Klein et al. (eds). "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch.9, 141
[68] Paris Agreement (2015), Art 4.2, 4.3

and developing states (economy-wide reductions vs enhancing mitigation with view to move toward economy-wide reductions), also foresees a progression in the mitigation obligations of developing states.[69] However this progression may depend on the level of support received by developing countries, thus requiring a progression in finance flows.[70] While Article 4.5 says that "support shall be provided" to developing countries for the implementation of Article 4, "in accordance with Articles 9, 10 and 11" on finance, technology and capacity building. While these latter articles specify developed country support,[71] Article 4 leaves this open – but regardless, as it must be read in accordance with the later articles, it implies developed country support. Developed country support need not only be the transfer through public channels, but would also require leveraging non-state actors, ensuring participation of non-party stakeholders as well as engaging private finance and international financial institutions to align their financial flows with the objectives of the Agreement.[72]

Even if the 2015 Paris Agreement as it currently stands is fully implemented by all parties, it may be difficult to keep the increase in global temperatures below 2 °C, let alone achieve the target of 1.5 °C.[73] The sum of the NDCs will leave an emissions gap, and as a result, the strength of review and compliance as well as motivation of state parties' to progressively increase their commitments and display ambition will be critical in determining the adequacy of the Agreement.[74] The failure of the Paris Agreement would have catastrophic consequences for human rights.

Normative Content of Relevant Human Rights

As has been stressed previously, climate change is and will affect a variety of human rights. These can be direct and indirect effects. The international human rights regime is significantly more developed than the climate regime but there has been limited overlap between the two. This section explains the normative content of a few relevant human rights and human rights law concepts and principles, as well as briefly discussing certain procedural guarantees in place to protect from and remedy human rights violations. For the purposes of this paper we will look specifically at the Right to Health, the Right to the

[69] Ibid, Art 4.4
[70] Winkler (n67), 149
[71] Paris Agreement (2015), Art 9.1, 11.3
[72] Dagnet and Northrop. "Facilitating Implementation and Promoting Compliance (Article 15)" in Klein et al. (eds). "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 20, 349
[73] Boyle (n54), 760
[74] Winkler (n67), 163

Benefits of Scientific Progress, the Right to Housing, the Right to Work, and the Rights of Indigenous Peoples.

Before we continue onto the substance of these individual rights, there are two concepts that must be clearly defined. The first is the matter of **Core Minimum Obligations.** The wording of Article 2 of International Covenant on Economic, Social and Cultural Rights (ICESCR) provides for states to "take steps, individually and through international assistance and co-operation, especially economic and technical, to the maximum of its available resources, with a view to achieving progressively the full realization of the rights".[75] This seemingly provides state parties with a degree of flexibility, contrasting with the language in the Covenant on Civil and Political Rights (ICCPR) where parties must "respect and ensure" the rights recognised in that treaty.[76] This however does not liberate states from responsibility. According to the Committee on Economic, Social and Cultural Rights (CESCR), while the treaty provides for progressive realization and acknowledges constraints due to limited resources, "it also imposes various obligations which are of immediate effect."[77] Furthermore, while the rights may be realized progressively, "steps towards that goal must be taken within a reasonably short time after the Covenant's entry into force for the States concerned."[78] Within the same general comment, the CESCR put forward the concept of a core minimum obligation "to ensure the satisfaction of, at the very least, minimum essential levels of each of the rights is incumbent upon every State party."[79] This means that if a state is not offering a minimum level of primary healthcare or education, for example, they can be found in violation of their human rights obligations. In a climate related example, a state does not necessarily violate its ICESCR obligations by failing to prevent water pollution, if, however, "the failure results in the infringement of "minimum essential levels" of the right to water, the state has violated a core obligation, and the state may not justify its non-compliance by claiming a lack of sufficient resources."[80]

To meet these minimum core obligations, states are obliged to use all available resources. This includes **international assistance and cooperation** in undertaking steps to realize the full enjoyment of human rights. The CESCR noted that the phrase "to the maximum of its available resources" was

[75] ICESCR (1966), Art 2.1
[76] ICCPR (1966), Art 2.1
[77] CESCR. "General Comment 3: The Nature of State Parties' Obligations" (1990). UN Doc E/1991/23, Para 1
[78] Ibid, Para 2
[79] Ibid, Para 10
[80] Knox (n4), 183

intended by the drafters of the Covenant to refer to both the resources existing within a State and those available from the international community through international cooperation and assistance and the role of cooperation in facilitating the fulfilment of the rights are acknowledged in several articles within the treaty.[81] As a result, states have a duty to reach out for international cooperation and assistance. Similarly, according to the UN Charter, States have an obligation to "take joint and separate action in co-operation" in promoting the **"**universal respect for, and observance of, human rights".[82] "One possible interpretation is that, while the primary responsibility for meeting the obligations under the ICESCR remains on the State with jurisdiction over the people concerned, States in a position to assist other States to meet those obligations are required to do so."[83] When applied to climate change, the implication of this interpretation is that the requirement to assist other States requires richer countries to help poorer States pay the costs of climate action to protect human rights from violation.[84]

The Right to the Highest Attainable Standard of Health

The Right to Health is contained in Article 12 of the ICESCR.[85] It is widely recognised, considered a prerequisite to the fulfilment of various other human rights and extends to the underlying determinants of health such as food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment.[86] It is not a right to be healthy, as CESCR points out, but rather "must be understood as a right to the enjoyment of a variety of facilities, goods, services and conditions necessary for the realization of the highest attainable standard of health."[87] It is judged via the AAAQ framework, namely on Availability, Accessibility, Acceptability and Quality.[88]

There are several relevant facets of the interpretation of the right to health by the CESCR in relation to climate change. The obligation to fulfil the right to health involves protecting and/or reducing environmental health hazards. The CESCR specifically mentions that states should "formulate and

[81] CESCR (n77), Para 13
[82] UN Charter (1945), Art 55, 56
[83] McInernay-Lankford et al. (n41), 42
[84] Ibid
[85] ICESCR (1966), Art 12
[86] CESCR. "General Comment 14: The Right to the Highest Attainable Standard of Health" (2000), UN Doc E/C.12/2000/4, Para 3, 4
[87] Ibid, Para 9
[88] Ibid, Para 12

implement national policies aimed at reducing and eliminating pollution of air, water and soil, including pollution by heavy metals such as lead from gasoline."[89] Internationally the CESCR prescribes, "depending on the availability of resources, States should facilitate access to essential health facilities, goods and services in other countries, wherever possible, and provide the necessary aid when required" and that states should offer assistance and cooperation in providing humanitarian or disaster relief.[90] Article 12 requires States to cooperate and assist one another to achieve the full realization of the right to health. "As the Alma-Ata Declaration proclaimed, "the gross inequality in the health status of the people, particularly between developed and developing countries, as well as within countries, is politically, socially and economically unacceptable and is, therefore, of common concern to all countries."[91]

The Right to Housing

The Right to an Adequate Standard of Living is found in Article 11 of the ICESCR and the right to adequate housing derives from it.[92] The CESCR has urged parties to not take a basic definition of what housing refers to but rather "it should be seen as the right to live somewhere in security, peace and dignity."[93] There are several key aspects that States should take into account to achieve the right to housing: legal security of tenure, availability of services, materials, facilities and infrastructure, affordability, habitability, accessibility, location and cultural adequacy.[94] States parties must also give priority to those social groups living in unfavourable conditions by giving them particular consideration.[95] With the considerable threat of forced displacement from rising sea levels and increased natural disasters, the right to housing comes under considerable duress from climate change. A 2009 OHCHR report prescribes several human rights guarantees in the context of climate change including: adequate protection of housing from weather hazards, access to housing away from hazardous zones, access to shelter and disaster preparedness in cases of displacement caused by extreme weather events and

[89] Ibid, Para 36
[90] Ibid, Para 39, 40
[91] McInernay-Lankford et al. (n41), 16
[92] ICESCR (1966), Art 11
[93] CESCR. "General Comment 4: The Right to Adequate Housing" (1991). UN Doc E/1992/23, Para 7
[94] Ibid, Para 8
[95] Ibid, Para 11

protection of communities that are relocated away from hazardous zones, including protection against forced evictions".[96]

The Right to Work

The right to work can be found in Article 6 of the ICESCR.[97] As the CESCR states, the right to work should not be understood as an absolute and unconditional right to obtain employment but rather the right of every human being to decide freely to accept or choose work.[98] Article 6.2 provides a non-exhaustive list of obligations on states to ensure the right to work, including "technical and vocational guidance and training programmes, policies and techniques to achieve steady economic, social and cultural development and full and productive employment under conditions safeguarding fundamental political and economic freedoms to the individual."[99] The CESCR outlines a similar AAAQ framework for the achievement of this right.[100] Specific legal obligations arising from this right include duties to prohibit forced or compulsory labour and refraining from denying or limiting equal access to decent work for all persons.[101] It also requires states he duties to adopt legislation or to take other measures ensuring equal access to work and training and to ensure flexibility in the labour market, but not at the cost of job security.[102] The obligation to fulfil the right to work requires parties to take positive measures to enable and assist individuals to enjoy the right to work and to implement technical and vocational education plans to facilitate access to employment.[103] Climate change and the sustainable energy transition will fundamentally reshape our societies as the fabric of our economy is dependent upon the plentiful and relatively inexpensive supply of fossil fuels.[104] With the required transition away from fossil fuels, many jobs and livelihoods will be at risk, and as things are in a connected economy, this will have massive ripple effects. The obligations to protect the right to work will be key toward ensuring a just transition.

[96] McInernay-Lankford et al. (n41), 17
[97] ICESCR (1966), Art 6
[98] CESCR. "General Comment No. 18: The Right to Work" (2006). UN Doc E/C.12/GC/18, Para 6
[99] ICESCR (1966), Art 6.2
[100] CESCR (n98), Para 12
[101] Ibid, Para 23
[102] Ibid, Para 25
[103] Ibid, Para 27
[104] Newell and Mulvaney. "The political economy of the 'just transition'" (2013). *The Geographical Journal,* 179(2), 4

The Right to the Benefits of Scientific Progress

A lesser known right, it is found in Article 15.1(b) of the ICESCR.[105] It is usually regarded as a means to advance the realization of other human rights and to address "the needs common to all humanity".[106] The Special Rapporteur on Cultural Rights says the normative content of the right to benefit from scientific progress includes access to the benefits of science by everyone, without discrimination; opportunities for all to contribute to the scientific enterprise and freedom indispensable for scientific research; participation of individuals and communities in decision-making; and an enabling environment fostering the conservation, development and diffusion of science and technology.[107] The free diffusion of science seems to contradict intellectual property rights, and the Special Rapporteur recognises the potential of intellectual property regimes to obstruct new technological solutions to critical problems such as food, energy and climate change.[108]

There is a need to strengthen international cooperation in the area of science, develop the scientific and technological capacity of developing countries, ensure the international dissemination of scientific knowledge and research, particularly among industrialized and developing countries, and call for transfers of technologies, practices and procedures.[109] For developing countries, this right also obliges the development and dissemination of inexpensive technology to improve the lives of marginalized communities.[110] This last point in particular has special consequences for sustainable energy transitions in encouraging states to pursue cheaper, decentralized energy for marginalized, rural areas to improve energy access rather than pursuing costlier central grid expansions that may not make as much economic sense in those areas for return on investment.

Indigenous Peoples' Rights

While there is no mention of indigenous peoples' specifically in the core human rights treaties, it can find some expression in Article 27 of the ICCPR, which applies to minorities and dictates that minorities "shall not be denied the right, in community with the other members of their group, to enjoy their own

[105] ICESCR (1966), Art 15.1(b)
[106] UN Human Rights Council. "Report of the Special Rapporteur in the field of cultural rights, Farida Shaheed: The right to enjoy the benefits of scientific progress and its applications". (2012). UN Doc A/HRC/20/26, Para 2
[107] Ibid, Para 25
[108] Ibid, Para 56
[109] Ibid, Para 66-67
[110] Ibid, Para 68

culture, to profess and practise their own religion, or to use their own language."[111] While this is not specific to indigenous peoples', the Human Rights Committee (HRC) acknowledges that to enjoy a particular culture may consist in a way of life which is closely associated with territory/land and use of its resources which is particularly true for indigenous people who have a close connection to their land.[112] This also extends to traditional activities such as fishing or hunting and the right to live in reserves protected by law and the enjoyment of these rights require positive legal measures of protection and measures to ensure the effective participation of members the community in decision making.[113]

The UN General Assembly adopted the Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007. Even though it is not legally binding, it is a landmark document to outline the ways in which human rights must be interpreted for the protection of the rights of indigenous peoples. A key concept within this framework is **free, prior and informed consent (FPIC)**. The UNDRIP prescribes that indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves, as well as to maintain and develop their own indigenous decision-making institutions. Furthermore, States must consult and cooperate with the indigenous peoples concerned to obtain their FPIC before adopting and implementing legislative or administrative measures that may affect them.[114] FPIC is a binding legal standard through ILO Convention 169 which reiterates the requirement of states to consult and obtain the consent of indigenous peoples' for any legislative or administrative measures that may affect them. It also forbids the forced relocation of indigenous peoples' unless in exceptional circumstances, and even then, only with their FPIC.[115] Much of the human rights concerns of climate change will have special impacts on indigenous peoples and as will be discussed in later chapters, the mitigation measures and moves toward renewable energy have also led to violations of the rights of indigenous peoples.

With a better understanding of the normative content of relevant rights as well as that of the international climate regime, it is now worth looking at the ongoing interactions and synergies between the two.

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[111] ICCPR (1966), Art 27
[112] HRC. "General Comment No. 23: The rights of minorities" (1994). UN Doc CCPR/C/21/Rev.1/Add.5, Para 3.2
[113] Ibid, Para 7
[114] UN General Assembly. "Declaration on the Rights of Indigenous Peoples" (2007). UN Doc A/RES/61/295, Art 19, 20
[115] ILO Convention 169 (1989), Art 6, 16

Chapter 3: The Nexus Between Climate Action and Human Rights

While the international climate regime and the international human rights regime are separate, there are obvious and clear connections between their goals and a greater level of synergy is required in achieving such. However, this interaction between the two regimes is more recent phenomenon and there is still much room for development. The lateness of the human rights regime in picking up the importance of climate change should not now prevent it from engaging closely with the climate framework. The human rights community was slow to recognise the link between climate change and the protection of fundamental rights but now looking at the list of adverse consequences, it is easy to see that most protected rights could be undermined by climate change. "Once the link between climate change and human rights became obvious and communities started experiencing the adverse impacts, the human rights community started lobbying to get a human rights provision included in climate documents."[116] This chapter analyses the results of this lobbying, the increasing cooperation between the two and possible avenues of reinforcement and development.

Ongoing Synergies Between Human Rights and Climate Action

The Male Declaration on the Human Dimension of Global Climate Change, adopted by representatives of SIDS in November 2007 was the first intergovernmental statement explicitly recognising that climate change has "clear and immediate implications for the full enjoyment of human rights", including the rights to an adequate standard of living and to the highest attainable standard of health and requested the Human Rights Council to convene a debate on human rights and climate change; OHCHR to study the effects of climate change on the full enjoyment of human rights, and the COP to seek the cooperation of OHCHR and the Council in assessing the human rights implications of climate change.[117] In 2008, the Human Rights Council adopted its first resolution on climate change and human rights. In resolution 7/23, the Council expressed its concern that climate change poses an immediate and far-reaching threat to people and communities around the world and has implications for the full enjoyment of human rights.[118]

[116] Atapattu and Schapper (n3), 208
[117] UN Human Rights Council (n14), Para 7
[118] Ibid, Para 8

In a 2009 OHCHR Report, the threat of climate change to the enjoyment of various human rights were reiterated, and it drew a series of interesting conclusions. It identified that the effects on human rights can be of a direct nature, such as the threat extreme weather events may pose to the right to life, but often it has an indirect and gradual effect on human rights, such as increasing stress on health systems and vulnerabilities related to climate change-induced migration.[119] The report mentioned the contraction of snow-covered areas, sea level rise and higher thermal temperatures, increases in extreme weather events and increases in tropical cyclones as some of the main consequences of climate change. In addition to this it also spoke of more localized impacts such as health effects, impacts on food and water availability and supply, changes in cultivation patterns, and pests, among other issues that would impact millions of people's lives.[120]

It also identified how climate change may exacerbate existing vulnerabilities, especially among the most vulnerable groups of society.[121] The most important takeaway from this report however, was that "the physical impacts of global warming cannot easily be classified as human rights violations, not least because climate change-related harm often cannot clearly be attributed to acts or omissions of specific States."[122] It did stress though that addressing that harm remains a critical human rights concern and obligation under international law and that legal protection remains relevant as a safeguard against climate change-related risks and infringements of human rights resulting from policies and measures taken at the national level to address climate change.[123] In other words "the report did not conclude that climate change necessarily violates human rights law, but it stressed that States nevertheless have obligations to take steps to protect human rights from the harmful effects of climate change."[124] This distinction relates to the problem of pinpointing causality between the effects of climate change and GHG emissions that caused climate change and will be discussed in greater detail later.

2009 marked the year for escalating human rights lobbying of the climate regime. Before COP15 in Copenhagen, 20 special procedure mandate holders issued a joint statement "emphasizing that climate change poses serious threats to the full enjoyment of a broad range of human rights, warning that a weak outcome of the negotiations would threaten to infringe upon those rights and stating

[119] UN General Assembly. "Report of the Office of the United Nations High Commissioner for Human Rights on the relationship between climate change and human rights" (2009). UN Doc A/HRC/10/61, Para 92
[120] Atapattu and Schapper (n3), 209
[121] UN General Assembly (n119), Para 94
[122] Ibid, Para 96
[123] Ibid
[124] UN Human Rights Council (n14), Para 9

that mitigation and adaptation measures should be developed in accordance with human rights norms, including with the participation of affected communities."[125] The next year, at COP16 in Cancun, the parties' adopted a decision which included the line "Parties should, in all climate change related actions, fully respect human rights".[126] In 2012, the Human Rights Council decided to establish a mandate on human rights and the environment, first creating the post as an Independent Expert and later as a Special Rapporteur.

According to the former UN Special Rapporteur on Human Rights and the Environment, "the attention to climate change and human rights reached a crescendo" at COP21 in Paris.[127] The United Nations High Commissioner for Human Rights made a powerful statement that urgent, effective and ambitious action to combat climate change is not only a moral imperative, but also necessary in order to satisfy the duties of States under human rights law while the Special Rapporteur on human rights and the environment also reminded States that their human rights obligations encompass climate change and urged them to adopt a rights perspective in negotiating the new agreement.[128] The result was the inclusion of human rights in the preamble of the Paris Agreement, urging States to respect, promote and consider their human rights obligations when taking action to address climate change.[129]

The Paris Agreement is the first climate agreement to explicitly recognise the relevance of human rights.[130] The Special Rapporteur considers this a "real achievement" worth celebrating and continues that "the Paris Agreement signifies the recognition by the international community that climate change poses unacceptable threats to the full enjoyment of human rights and that actions to address climate change must comply with human rights obligations."[131] The inclusion of human rights in the preamble is certainly a landmark but it represents a starting point in the nexus, rather than an end goal.

The mention of human rights in the Paris Agreement gives no binding obligations, but the use of the word "should" is indicative of a "soft" obligation to integrate norms or principles of international human rights law. It is worded in a way to also encourage the prevention of impairment of human rights

[125] Ibid, Para 11
[126] Ibid, Para 12
[127] Ibid, Para 17
[128] Ibid
[129] Paris Agreement (2015), Preamble, Para 11
[130] UN Human Rights Council (n14), Para 20
[131] Ibid, Para 22

through mitigation and adaptation projects as have arisen in the past.[132] Another important facet of the wording is in the provision to "respect, promote and consider" human rights obligations, which excludes the traditionally accepted duties of "protect and fulfil" as it was considered too operative for a preambular paragraph.[133] While not creating new obligations for parties, this provision does point parties to the need to harmonize climate action with human rights.[134]

But is this enough? Some scholars would argue no. Boyle levels various criticisms toward the way human rights is integrated via the Paris Agreement. He quotes Rajamani in saying, 'This recital carefully circumscribes the impact of an explicit reference to human rights in the Paris Agreement. Human rights law is neither incorporated into the Paris Agreement by this wording, nor does it explicitly constitute a standard by which the adequacy of efforts taken by the parties to implement the objectives of the Paris Agreement might be judged".[135] Its inclusion in the preamble does not constitute any obligations but rather serves to guide interpretation and the word "should" rather than "shall" implies a "less than wholehearted endorsement of the relevance of the various rights referred to".[136] The exclusion of the words "protect and fulfil" minimizes the commitment of the Agreement toward human rights and at best serves as a mere recognition that parties should take into account human rights obligations in their actions to address climate change, falling quite short of a "true incorporation" of human rights into the climate regime. Furthermore, he takes issue with the specific catalogue of rights and groups mentioned in the paragraph, arguing that the inclusion of some rights over others and some groups over others "looks more like a list of categories designed to satisfy special interest groups rather than a serious attempt to address the relationship between human rights law and climate change".[137]

Much of this can be attributed to the very nature of international human rights law, where dealing with violations is often reactive rather than proactive. As the OHCHR recognised a decade ago, it is unclear whether climate change actually violates human rights law, owing to the difficulty in identifying responsibility for historic GHG emissions. A second problem is the transboundary nature of climate change – as causality is virtually impossible to prove up to the standards required by human rights law

[132] Carazo. "Contextual Provisions (Preamble and Article 1) in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 6, 114-115
[133] Ibid, 115
[134] Carazo and Klein. "Implications for Public International Law: Initial Considerations" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 23, 401
[135] Boyle (n54), 769
[136] Ibid, 769-770
[137] Ibid.

to invoke extraterritorial obligations, it is nearly impossible to hold emitting states accountable for human rights violations in frontline states. The next section explores this in greater detail, while also discussing potential solutions in how human rights may be used to reinforce climate action obligations.

Reinforcing Obligations

As identified in the previous section, one of the primary barriers to claiming human rights violations as a result of climate change arises from the transboundary nature of climate change and the difficulty in pinpointing causality, making it nearly impossible to assign responsibility – especially to the historically high-emissions states. Human rights obligations towards those most affected by climate change will at the very least require governments to take appropriate steps to mitigate the risk of harm within their own borders the key question is not whether GHG emitting States have to mitigate the harm to their own citizens, but whether they also have a responsibility to protect people in other States from the harmful impacts of those emissions on the global climate.[138] The standards for invoking extraterritorial obligations are quite stringent, with effective control being the usual test to determine whether a state has jurisdiction outside its borders but this standard seems impossible to prove in the case of the adverse effects of climate change. As Knox says, "If aerial bombardment does not give states effective control of the places affected, it seems unlikely that such control would result from the less immediate and drastic measure of allowing GHG to cross international borders."[139]

There are several other barriers to pursuing international litigation for climate damages, especially those occurring extraterritorially. In Gromilova's article regarding the situation of Tuvalu, a small low-lying Pacific island state that may be entirely submerged due to rising sea levels, she outlines several of the issues with Tuvalu claiming damages by high-emitting states. These include: a) recognition of the jurisdiction of the ICJ which the US, the historically largest GHG emitter, does not recognise; b) the prohibitive cost of pursuing litigation for LDCs; and c) the threat of political backlash by developed states.[140] Even though it is an accepted custom that no state shall cause harm to another, to establish a breach of this rule, Tuvalu will have to show that there is: a) a wrongful act attributable to the State; b) a causal link between the activity and damage; c) a violation of either international law or

[138] Ibid, 771
[139] Knox (n4), 204
[140] Gromilova. "Rescuing the People of Tuvalu: Towards an I.C.J. Advisory Opinion on the International Legal Obligations to Protect the Environment and Human Rights of Populations Affected by Climate Change" (2015). *Intercultural Human Rights Law Review* 10, 246-247

a violation of a duty of care, which is d) owed to the damaged State.[141] To establish these criteria is near impossible under contemporary international law. Scientifically speaking, it is difficult to prove that the injury was caused by climate change, provoked by the behaviour of any particular state (the effects felt by Tuvalu from climate change have been diffused through the GHG contributions of many states), rather than "purely natural events", leaving alone the spatial and temporal distance which hamper the establishment of causality. Furthermore, most of the damages that Tuvalu will experience have not actually happened yet and arguments of intergenerational equity and precautionary principle are still emerging in international law and not fully developed.[142] Extraterritorial obligations are a controversial topic, and there is still no legally binding document that elaborates on the content of the topic – only soft law.[143] Given the terms of the Kyoto Protocol, and the "essentially voluntary" character of key provisions of the Paris Agreement, it is far from clear that inadequately controlled climate change violates any existing treaty obligations or general international law and the argument that policy which complies with the climate regime on emissions reductions nevertheless violates human rights obligations is not easy to make.[144]

But perhaps the focus on duty-bearers and responsibility is misplaced. It would be more fruitful to look at positive obligations rather than responsibility for wrongful acts, and how human rights law can help spur climate action efforts rather than punishing historic emissions. Quoting the Special Rapporteur on Human Rights and the Environment, Boyle argues that obligations to protect human rights in the context of internal environmental harm 'can also inform the content of the duty of international cooperation when that duty pertains to a global environmental challenge such as climate change'. On this view of human rights law 'All states have a duty to work together to address climate change, but the particular responsibilities necessary and appropriate for each State will depend in part upon its situation."[145] What does this mean? In the absence of tangible extraterritorial obligations, states do still have the obligation to protect their own jurisdiction from climate change by pursuing mitigation and adaptation measures. This is still somewhat problematic however, as very few states contribute enough to the global GHG emissions that reductions in individual emissions would make a significant

[141] Ibid, 248
[142] Ibid, 249
[143] Ibid, 279
[144] Boyle (n54), 773
[145] Ibid, 774

impact – especially when accounting for growth in emissions elsewhere.[146] This does not preclude the obligation to take adaptation measures, nor the obligation to seek assistance for those measures.[147] Neither does it restrict the obligation for states to hold private actors accountable in the implementation of climate action measures within its jurisdiction.

States do also have a duty to try and influence the international community to reduce GHG emissions says Knox. "This duty may be derived from the duty to request assistance, but it is also akin to states' obligations to regulate private sources within their control."[148] States do not have control over one another, but they also don't have complete control over private actors, but human rights law still requires states to make best efforts and undertake due diligence to protect rights from interference from other actors, including other states. As a result, states have a duty to influence the international community to reduce emissions through persuasion or bargaining, or more practically, this obligation may require states to seek an effective international agreement to reduce GHG emissions to levels that protect its own people from the adverse effects of climate change. "In that context, its duties to its own people may obligate it to commit to reductions in its own emissions, as part of its effort to obtain such a global agreement."[149]

Positive obligations for states in terms of precautionary action to prevent environmental hazards are well established in human rights jurisprudence. In *Budayeva and Others v Russia*, regarding a mudslide in the town of Tyrnauz in the central Caucasus, the European Court of Human Rights stressed a State's responsibility to undertake preventative measures to reduce the risk of disasters occurring.[150] The court found that Russia ignored warnings that dangerous mudslides might occur, did not institute an early-warning system to allow people to evacuate in time and did not allocate funds for the repair of protective dams – concluding that Russia failed to establish the legal framework necessary to deter threats and thereby violated substantive human rights obligations.[151] Thus the question of whether

[146] Knox (n4), 197
[147] Ibid, 197-198
[148] Ibid
[149] Ibid
[150] Cubie and Hesselman. "Accountability for the Human Rights Implications of Natural Disasters: A Proposal for Systemic International Oversight" (2015). *Netherlands Quarterly for Human Rights,* 33(1), 33. See also *Budayeva and Others v. Russia* (ECtHR, 2008).
[151] Knox (n4), 175

climate change is a violation of human rights law is less relevant, as states have obligations to protect human rights from the effects of climate change regardless.[152]

The human rights regime also includes several procedural guarantees and mechanisms that can strengthen commitments to climate action. Firstly, UN human rights bodies could use their existing oversight powers to focus attention on how States parties respond to their climate commitments. The CESCR has begun to address the failure of some States to reduce GHG emissions, preserve carbon sinks, and promote renewable energy, and has also taken the view that the UNFCCC and Paris Agreement are relevant to interpreting the ICESCR.[153] The Universal Periodic Review (UPR) could provide another avenue for monitoring compliance. In addition to assessing compliance with human rights obligations, the UPR permits the Human Rights Council to monitor compliance with voluntary pledges and commitments made by States; it would make sense for the pledges under the Paris Agreement to fall within this category given the potential impact of climate change on human rights.[154] Furthermore, considering the wide range of potential human rights violations arising from disasters, it would be appropriate for a State's actions pre- and post-disasters to be examined as part of the UPR process.[155]

There are also several procedural obligations of states key to protecting human rights violations from environmental harm. These include duties: (a) to assess environmental impacts and make environmental information public; (b) to facilitate public participation in environmental decision-making, including by protecting the rights of expression and association; and (c) to provide access to remedies for harm.[156] Participation is particularly vital. Article 6(a) of the UNFCCC encourages States to promote and facilitate "public participation in addressing climate change and its effects and developing adequate responses" and is also reiterated in the Paris Agreement.[157] These requirements on participation apply not only to decisions about how much climate protection to pursue, but also to the measures through which the protection is achieved and decisions on mitigation or adaptation projects must be made with the informed participation of the people who would be affected by the projects.[158] States should also ensure that international climate financing mechanisms also respect and protect human rights,

[152] Ibid, 195
[153] Boyle (n54), 774
[154] Ibid, 775
[155] Cubie and Hesselman. (n148), 35
[156] UN Human Rights Council. (n14), Para 50
[157] UNFCCC (1992), Art 6(a)(iii)
[158] UN Human Rights Council. (n14), Para 59

especially as certain mechanisms, like the CDM have been criticised in the past for not facilitating enough stakeholder participation.[159]

The Right to Remedy is the last mentioned by the Rapporteur and he once again acknowledges the difficulties of determining where contributions to climate change constitute human rights violations although he reiterates that finding a violation is not a prerequisite for addressing damage to those affected by and vulnerable to climate change.[160] Climate litigation is an expanding area but has seen breakthroughs in domestic scenarios. "Litigious action in human rights for the climate change consequences of emissions policy has recently met with relative success, and recent case law has contradicted the idea that liability can be universally avoided simply because of an inability to show direct causation by a single state."[161] The District Court of The Hague found in *Urgenda Foundation v State of the Netherlands* that 'a sufficient causal link can be assumed to exist between the Dutch GHG emissions, global climate change, and the effects … on the Dutch living climate' and found that Dutch emissions reduction targets were below the standard deemed necessary by climate science as set out in international agreements to which the Netherlands was a party. In order to prevent dangerous climate change, GHG emissions must be reduced by 25–40 per cent by 2020 based on 1990 levels and the Court ordered that the Government limit Dutch GHG emissions to 25 per cent by 2020.[162] As a result, mitigation policy is indeed justiciable.

This chapter discussed the various ways human rights law interacts with climate change and the principles and obligations that can strengthen climate action commitments, especially in terms of mitigation policy and the reduction of GHG emissions. The next chapter talks about Sustainable Energy Transitions, a key strategy in mitigation action. The energy transition from fossil fuels to renewables is accelerating in many countries, spurred by environmental obligations but what are the human rights dimensions of this? How does human rights law reinforce the idea of a just energy transition? How can the energy transition help protect human rights? And lastly, how can the energy transition be carried out in a way that respects and protects human rights?

[159] Ibid, Para 61
[160] Ibid, Para 64
[161] Cullen. "Eaten by the sea: Human Rights claims for the impacts of climate change upon remote subnational communities" (2018). *Journal of Human Rights and the Environment*, 9(2), 173
[162] Ibid, 188

Chapter 4: The Sustainable Energy Transition and Human Rights

One of the key strategies for mitigation action is the increased use and accelerated transition to renewable energy. A move away from fossil fuels would cut the biggest contributor to GHG emissions globally. The goals laid out in the Paris Agreement cannot be achieved without a significant increase of renewable energies and energy efficiency, and a reduction of fossil fuel production, consumption and related subsidies.[163] This is a monumental task that requires a fundamental shift in a global economy that is still largely carbon-based. But a shift is emerging. The Paris process was an important driver, and catalysed "unprecedented commitments for low-carbon investment to accelerate the transition to a cleaner energy economy" and over 400 investors representing more than USD 24 trillion in assets committed to increasing low carbon and climate resilient investments.[164] For all intents and purposes, this is a transition that is already underway.

The International Energy Agency (IEA) has projected an increase in the share of renewables in the global electricity generation mix from over 23% in 2015 to almost 28% in 2021 and investments in onshore wind and solar are progressing toward the global goal of limiting temperature rise to 2°C.[165] This is aided by the falling costs of renewables. According to the World Economic Forum, in 2006, solar costs would be around USD 600/MWh, much above the widely-used coal and natural gas sources at USD 100/MWh. However, solar costs were halved five years later, and compressed again to around USD 100/MWh by 2016 while wind costs are around USD 50/MWh.[166] But a sustainable energy transition is a lot more than switching the fuels used for our energy needs, although that is a major aspect. It also includes innovating new distribution and delivery systems, increasing efficiency, changing behaviours, shifts in policy. It would not be an exaggeration to say it involves a fundamental change in the way society is structured. This chapter discusses the energy transition in greater detail, while also outlining its relationship with human rights, both in how it can help protect them from a changing climate reality but also how we must consider human rights in order to ensure a just energy transition that respects and protects human rights.

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[163] Carazo and Klein (n132), 409

[164] Ivanova (n27), 24

[165] Pinamonti. "The Human Rights Implications of the Renewable Energy Transition" (2017). *Business for Social Responsibility.*

[166] Vanham. "A Convenient Truth - Fighting Climate Change Turned into a Profitable Business" (2016). *World Economic Forum.*

What is the Sustainable Energy Transition?

Energy systems are among the largest human enterprises, comprising 9 of the 12 most heavily capitalized companies in the world. They form the heart of the technological arrangements around which contemporary industrial economies are organized. Efforts to transform energy systems involve changes, therefore, not only to energy technologies and prices but also to the broader social and economic assemblages that are built around energy production and consumption.[167] Currently, the bulk of the global energy portfolio is based on fossil fuels (oil, coal, natural gas, etc) but the consensus around the dangers posed by climate change has given rise to a transition away from carbon-heavy fuels toward renewable energy that has far less GHG emissions. Energy production and consumption make up the bulk of GHG emissions, up to 80% in some industrialized countries, which means policies must shift toward alternative energy systems. This is a process already underway, with many recognising that fossil fuel use, especially oil will peak soon, and the doctrine of sustainable development encouraging developing nations where energy use must increase in order to alleviate poverty, to adopt more sustainable energy pathways than that which was followed by developed states.[168]

The traditional barrier to switching to renewable energy has been cost. The fuels used in renewables are everywhere (solar, hydro, wind, etc) but the cost of utilizing such and storing such has been prohibitive. But trends over the last few years are encouraging. Since 2008, the global solar module price index has fallen by a factor of nearly four, a rate of technical advance that vastly exceeded nearly all predictions and declines in the cost of wind power—while not as dramatic—have been rapid by any standard.[169] "These advances both spur private investment and generally ease the politics of supporting clean energy transitions. Investments in energy production have reflected these shifts. In 2014, for the first time in history, the amount of new renewable generation capacity surpassed that of new fossil fuel-based systems on a global basis." [170] This trend continued the next year and a welcome GBP 198 billion was invested worldwide in renewable energy in 2015, marking also the largest annual

[167] Miller, Iles and Jones. "The Social Dimensions of Energy Transitions". (2013). *Science as Culture,* 22(2), 135
[168] Bradbrook (n17), 512
[169] Arent et al. (n21), 5
[170] Ibid

increase of clean energy implementation. Renewable energy is expected to become the largest source in global electricity production by 2030.[171]

Investment and cost reductions aren't enough however. Energy efficiency has a massive role to play as well, some scholars even calling it "the most obvious contributor to sustainable energy" highlighting the need for it to be promoted in all sectors of the economy such as transport, buildings, industry and consumer goods.[172] Research by the IEA shows, that energy efficiency can potentially make a greater contribution to stabilising carbon emissions than all the clean energy sources (including nuclear energy). Energy efficiency is perhaps discounted in that it does not generate new energy but simply reduces the rate of consumption of existing energy, but one may consider that a unit of energy saved is equivalent to a unit of energy generated.[173] Comprehensive legislation on energy efficiency is a must, or there is a risk, especially in the drive towards developing new energy-generating capacity, there will be "profligate squandering of the remaining fossil-fuel resources and unnecessary aggravation of atmospheric carbon emissions and other environmental issues."[174] A sustainable energy transition must include the wide-scale adoption of energy-efficient technology and investments in measures to improve energy efficiency.[175]

Energy transitions must be understood in terms of more than just fuel and technology; as transitions in fuels are inevitably accompanied by widespread social, economic, and political transformations that must be factored in. The technologies of production and consumption are modular and can be flexibly morphed into a diverse range of overarching energy systems; which means the question is much greater than the fuel used or even the technologies utilised but rather the policy-level, social, economic and political arrangements that define the energy system.[176] An important aspect of the energy transition comes from how energy is distributed, how these distribution systems are designed and how to ensure that distribution systems are just.

Distributional justice recognises both the physically unequal allocation of environmental benefits and ills, and the uneven distribution of their associated responsibilities, and refers not only to the siting of power generation which may have ecological and social impacts but also in the access to

[171] Business and Human Rights Resource Centre. "Towards Responsible Renewable Energy" (2016). *BHRRC Briefing Note.*
[172] Bradbrook (n17), 514
[173] Ibid.
[174] Ibid, 515
[175] Steg et al. (n16), 11
[176] Miller et al. (n167), 139

the power generated.[177] By 2030, the year for completion of the SDGs where SDG 7 demands the ensuring of universal energy access, a billion people will remain without access – 80% of whom will be in rural areas.[178] To be able to extend energy services to those who are marginalized, Sustainable Energy for All (SEforALL) estimates that it will require central grid extension for all new urban connections and 30% of rural populations, with the remaining 70% of rural people gaining access through decentralized solutions (65% via minigrids, 35% via solar home systems (SHS) and intra-household or 'pico-solar' products).[179] Innovative design will be necessary to ensure scalability of decentralised energy to meet growing demand, but small-scale solutions will be instrumental as an entry-point on a path out of energy poverty. As a result, decentralised energy will play a crucial role moving forward, as one aspect of the energy transition. But what are the direct impacts of this transition on human rights? The next section will look at the nexus of this energy transition on some substantive rights, starting with the right to health.

The Right to Health and Sustainable Energy Transition

Climate change will affect the health of millions of people, including through increased malnutrition, diarrhoeal, cardio-respiratory and infectious diseases, and affect the intensity of many types of diseases: vector-borne diseases (such as malaria and dengue fever); water-borne diseases; and respiratory diseases (such as asthma).[180] The World Health Organization (WHO) estimates that the global health costs of climate change by 2030 will be approximately USD 2-4 billion, and that between 2030 and 2050, some 250,000 additional annual deaths will occur, largely from heat exposure, diarrhoea, malaria and childhood undernutrition.[181] The IPCC stresses that without taking mitigation measures, adaptation to life and health risks of climate change might not even be possible.[182] As climate change (and for that matter, pollution) impacts the underlying determinants of health, it can be argued that the right to health can be violated through unlawful polluting of air, water and soil through GHG

[177] Jenkins, McCauley, Heffron, Stephan and Rehner. "Energy Justice: A Conceptual Review" (2015). *Energy Research and Social Science* 11, 176
[178] Alstone, Gershenson and Kammen. "Decentralized Energy Systems for Clean Electricity Access" (2015). *Nature Climate Change,* 5(4), 305
[179] Ibid, 307
[180] Lanyi (n11), 269-270
[181] Hesselman and Toebes (n12), 1
[182] Ibid, 2

emissions, such as in contravention of emissions limits designed to protect human health.[183] The human rights obligations to mitigate climate change have been laid out in previous sections, and the same would apply toward protecting the right to health, in ensuring that all that can be done to minimize the risks of diseases and injury through climate change is done.

There are two key aspects of protecting the right to health that can be benefitted through a sustainable energy transition, albeit this is not an exhaustive list. It is a widely recognised fact that the combustion of fossil fuels results not only in harmful GHG emissions, but also, more locally, air pollution. Air pollution kills an astonishing number of people every year and causes massive damage in terms of health globally. Estimates vary but up to 52,000 people die in the US alone from small particles from GHG emissions each year.[184] These figures can be even higher in developing countries with less stringent regulation and enforcement. In India, coal-plants implementing the Environment Ministry issued emissions standards would save 76,000 premature deaths per year.[185] None of this is new information. That air pollution is associated with respiratory and cardiopulmonary diseases has been common knowledge for decades. Yet the burning of fossil fuels has gone unabated. But the drive toward renewables may be providing an avenue out. In China, societal pressures due to increasing air pollution has been one key factor pushing the CPC to close coal plants and turn to environmentally friendly power production, and this has been accompanied by an increasing institutional and political capacity for clean energy policy-making at the central level, causing China to accelerate its cleantech deployment.[186] Switching to renewable energy would drastically improve air pollution, and the savings would be substantial. International Renewable Energy Agency (IRENA) data says air pollution externalities range between USD 1.8 trillion and USD 6.0 trillion for outdoor air pollution, plus USD 0.8 trillion - 2.1 trillion for indoor air pollution. Increasing the rate of adoption of renewables can reduce these costs by up to USD 3.07 trillion by 2030.[187]

[183] Ibid, 12
[184] Apt. "The Other Reason to Shift away from Coal: Air Pollution That Kills Thousands Every Year" (2017). *Scientific American.*
[185] Bhagat. "With air pollution becoming a health emergency, shouldn't India transition faster from coal to renewables?" (2018). *Greenpeace.*
[186] Isoaho, Goritz and Schulz. "Governing Clean Energy Transitions in China and India" in Arent et al. (eds) "The Political Economy of Clean Energy Transitions" (2017), Ch.12, 244
[187] IRENA. "The True Cost of Fossil Fuels: Saving on the Externalities of Air Pollution and Climate Change" (2016). *Renewable Energy Roadmap Brief.* 6

Almost half the world's population cooks food daily using open fires or traditional cookstoves that rely on wood, manure, coal, and charcoal for energy.[188] The use of biomass fuels often results in the exposure to indoor air pollution via emissions of carbon monoxide and hydrocarbons; such exposure generally leads to illnesses and mortality in many developing countries with almost 2 million deaths per year.[189] Switching away from these fuels toward cleaner cooking fuels would have a massive impact on the health of many rural and poor, especially women and children.

The second key impact of the energy transition can be in healthcare delivery, especially using decentralised energy systems. Electricity access enhances access to quality essential health care services while making health systems more resilient, but this is an area that with severe deficiencies, especially in remote rural areas in developing countries. A joint report by the United Nations Foundation (UNF) and SEforALL says that a survey of 78 countries found that only 41% of low- and middle-income country health care facilities have reliable electricity.[190] Access to reliable energy has several tangible benefits for healthcare delivery. It is required for the operation of basic amenities, including lighting, ventilation, ICT, and life-saving medical devices and can enable expanded operating hours and increase capacity for night-time health provision. In health centres, access to reliable electricity is essential for ensuring the cold chain to safely preserve and store vaccines, blood, and other critical medicines requiring refrigeration, not to mention the powering of essential medical equipment such as heart rate monitors.[191] One of the main issues with electrifying remote rural areas is the high capital costs toward extending a centralized grid, especially considering potential difficult terrain. The infrastructural investment very often cannot be recuperated due to low incomes and economic activities in these areas (although both would increase with electrification). The dramatic cost reductions and technological improvement of solar technology in the past decade has made solar an economically and technically viable solution that can be deployed in a fraction of the time it would take the centralized grid to arrive.[192] While less-clean off-grid solutions may have comparable deployment costs, the benefits of using renewables are in a) less scope of harmful particulate pollution in the localized setting and b)

[188] Alam et al. (n19), 39
[189] Owoeye. "Access to energy in Sub-Saharan Africa: A human rights approach to the climate change benefits of energy access" (2016). *Environmental Law Review,* 18(4), 289
[190] UNF and SEforALL. "Lasting Impact: Sustainable Off-Grid Solar Delivery Models to Power Health and Education" (2019). 11
[191] Ibid, 22
[192] Ibid, 10

savings on fuel.[193] As a result, transitioning away from current energy practices toward cleaner practices, that incorporate localized design needs and the benefits of decentralized energy in providing healthcare in places without central grid access, can help boost the availability and accessibility of quality healthcare for marginalised populations. A more general shift away from fossil fuel combustion will help prevent particulate air pollution resulting in a boost of net welfare and improving the underlying determinants of health.

The Energy Transition and the Right to Housing

There are several key aspects of the normative content of the right to housing that can be benefitted or protected by a sustainable energy transition. The most obvious link is that climate mitigation is necessary to reduce the considerable threat of displacement and violations of the right to adequate housing from climate change and transitioning to renewable energy is one of the primary strategies for mitigation. But beyond that, there are several benefits for the protection of the right to housing.

The first comes from achieving the right by ensuring, among other things, the availability of basic services. Here again, energy access plays a key role, and this can be benefitted from adopting decentralized or off-grid energy. As stated by the WEHAB Working Group, "Although energy itself is not a basic human need, it is critical for the fulfilment of all needs. Lack of access to diverse and affordable energy services means that the basic needs of many people are not being met."[194] Access to energy has also been recognised as being linked to the right to housing by the South African Constitution.[195] As a result, electrification, especially in vulnerable areas and communities is an imperative to the guarantee of the right to housing. This electrification cannot rely on grid extension. Grid extension will be feasible for only 40% of the population, and stand-alone and local grid options must deliver electricity to 60% of the non-electrified rural areas.[196] Grid extension is also a more time-consuming process, in addition to a capital intensive one, and rapid expansion will prove challenging, especially in resource constrained states.[197] As a result, the cheaper and quicker deployment of off-grid energy can make it an attractive option to help electrification and the provision of basic housing services. Furthermore,

[193] Ibid, 26
[194] Bradbrook and Gardam. "Placing Access to Energy Services within a Human Rights Framework" (2006). *Human Rights Quarterly,* 28(2), 393
[195] Owoeye (n181), 297
[196] Bhattacharyya and Palit. "Mini-grid based off-grid electrification to enhance electricity access in developing countries: What policies may be required?" (2016). *Energy Policy*, 94, 166
[197] Ibid, 168

these approaches are not mutually exclusive and off-grid power systems can act as an ongoing complement to grid power (if and when it arrives), adding resiliency in the face of often-unstable grids in the developing world.[198]

Secondly, it is important to minimize the exposure to hazardous substances to protect the right to housing. As we previously discussed, carbon-based power generation releases particulate air pollution, which has increased effects for those who live downwind or in the locality. Living close to a carbon-based power plant significantly increases hospitalization rates for respiratory diseases, and the particulate matter released into the air from this combustion may also contain other heavy metals that increase the risk of cancer.[199] Similarly, fracking for oil, or other forms of surface-level fossil fuel extraction, can lead to contamination of water resources.[200] Renewables are not perfect either, but are considerably better in terms of localized impacts. It is true that geothermal energy can also lead to water contamination, and onshore wind production can cause injuries through noise.[201] However, transitioning to cleaner renewable energy sources can help minimize localized pollution and exposure to hazardous substances for nearby residences.

The Right to Work and Sustainable Energy Transition

A full-fledged sustainable energy transition will alter the fundamental foundations of our economic, social and political system as we know it. This will quite obviously affect jobs around the world, which means that it could affect the right to work. How can we ensure the move away from fossil fuels does not result in the loss of livelihoods of workers?

A just transition aims to take appropriate measures to protect jobs in vulnerable industries. This will be important where there is a risk that job losses would simply mean the transfer of carbon-intensive activities to other countries, or where organisations are failing to take sufficient steps to prepare for the low-carbon transition. Where job losses are unavoidable, adequate support would be needed for people and sectors that stand to lose out as a result of decarbonising the economy through compensation and retraining for new employment opportunities.[202] This will require positive measures by states to provide

[198] Alstone et al. (n170), 312
[199] Liu, Lessner and Carpenter. "Association between Residential Proximity to Fuel-Fired Power Plants and Hospitalization Rate for Respiratory Diseases" (2012). *Environmental Health Perspectives,* 120(6), 807-810
[200] "The Localized Health Impacts of Fossil Fuels". *Climate Nexus.*
[201] Bradbrook (n17), 515
[202] Newell and Mulvaney (n104), 3

vocational retraining and information to affected workers so that they can transition to cleaner jobs. Historically, fossil fuel job losses have been the result of mechanisation and the declining economic viability of fossil fuel extraction, but this will be replaced by climate policy and the falling costs of renewable energy.[203]

But this restructuring of the economy also brings opportunity for new jobs in new renewable sectors and for "green" economic growth. Besides positive environmental effects related to reductions in GHG emissions, increased spending on renewable energy infrastructure could potentially have the effect of an economic stimulus.[204] A recession brought on by failing fossil fuel industries could be remedied through this stimulus effect – a Keynesian macro-economic ideal that has regained relevance following its effectiveness in many economies after 2008. Creutzig and others argue that in the European context, focusing renewable infrastructure deployment in the peripheral countries where there is significant potential for energy production could provide enough stimulus to mediate the debt crisis.[205] Renewable deployment has had the effect of employment upticks in other places already. In 2017, solar produced twice as many jobs as coal in the US.[206] The UNFCCC estimates that the transition to renewable energy will create a net employment gain of 0.5-2% (15-60 million jobs globally) with many of these new jobs in emerging economies.[207] Renewable deployment will create additional jobs in industrial manufacturing sectors.[208] Being a major oil producer furthermore does not necessarily equate to significant levels of employment; less than 2,000 people are employed in the oil and gas industry in the Niger Delta.[209] Similarly, jobs in clean energy may also be of a higher quality than those in fossil fuel-based power production, where for example, working on wind farms may be safer and healthier for workers than in coal mines or combustion plants.[210] As a result, state action on investing in the sustainable energy transition and surrounding infrastructure can help fulfil the right to work, when coupled with measures for vocational retraining and proper dissemination of information for job seekers.

[203] Worrall, Roberts and Whitley. "Enabling a just transition to a low-carbon economy in the energy sector: Progress and lessons in Emerging Markets" (2018). *HSBC Centre of Sustainable Finance,* 8
[204] Creutzig et al. "Catching two European birds with one renewable stone: Mitigating climate change and Eurozone crisis by an energy transition" (2014), *Renewable and Sustainable Energy Reviews* 38, 1020
[205] Ibid, 1021
[206] Eckhouse. "Solar Beats Coal on U.S. Jobs" (2018), *Bloomberg Businessweek*.
[207] Worrall et al. (n203), 8
[208] Creutzig et al. (n204), 1021
[209] Worrall et al. (n203), 8
[210] Ibid, 9

Sustainable Energy Transition and The Right to Science

The Right to the Benefits of Scientific Progress can help reinforce moves toward the sustainable energy transition in a few ways. As was described earlier, this right imposes an obligation on developing states to invest in inexpensive technological solutions to improve the lives of marginalized and vulnerable communities. Decentralized and off-grid solutions seem to fit this bill. Small-scale, distributed installations currently deliver energy more cheaply as they do not have to account for the costs of building and maintaining the electricity grid and offer individuals and households a more personal, hands-on relationship with the production of energy.[211] Local ownership of these solutions can also lead to generating income from surplus energy, although questions still remain as to the capacity for these to generate enough income to cover operation and maintenance costs.[212] Localized grids furthermore, are documented as offering more stable electricity prices than those of national grids that are subject to market fluctuations and when electricity is accessible to local populations, this may spur economic development.[213]

The obligations for technology development and transfer (Art 10) embedded in the Paris Agreement may help promote the right to science. To implement the innovation and deployment of technology for mitigation and adaptation, there must be enhanced research and development in both developed and developing countries, with scope for easy transfer of these technologies. Enhanced R&D, new and improved technologies and reductions in cost are essential to underpin global climate action efforts. It is especially important in developing countries, to adapt new technologies and deployment models to local needs.[214] Developed countries must support deployment in developing countries through enhanced finance, technology sharing and capacity building – the latter being an obligation through Article 11 of the Paris Agreement.

One possible barrier to effective technology transfer is in the case of restrictive intellectual property (IP) regimes. Proponents of IP regimes argue that intellectual property regimes do not actually cause barriers, and even if they do, they are not as significant as trade barriers.[215] However, rationally

[211] Miller et al. (n167), 139
[212] UNF and SEforALL (n190), 37
[213] Kelly-Richards et al. "Governing the transition to renewable energy: A review of impacts and policy issues in the small hydropower boom" (2017). *Energy Policy* 101, 258
[214] De Coninck and Sagar. "Technology Development and Transfer (Article 10)" in Klein et al. (eds) "The Paris Agreement on Climate Change: Analysis and Commentary" (2017), Ch. 15, 267.
[215] Barton. "Patenting and Access to Clean Energy Technologies in Developing Countries" (2009). *WIPO Magazine.*

thinking, IP regimes can definitely cause impediments to effective technology transfer for climate action as they vest power to their holders to limit the availability and use of technology behind high acquisition and licensing fees. Scholars have noted that high licensing fees, protected by trade obligations related to IP, may also be contributing to the insufficient transfer of technology.[216] Amongst emerging economies, some have drawn parallels between the role of IP in climate technology transfer and IP during the AIDS epidemic, where IP associated with effective drugs prevented their dissemination in developing states, particularly in Africa.[217] It is thus an imperative that IP regimes, recognising the full scale of the challenge of climate change, do not create a barrier to technology transfer and the realization of the right to science.

Sustainable Energy Transition and Indigenous Peoples' Rights

There are several guarantees and provisions toward the protection of indigenous peoples' rights in the human rights framework, as was outlined earlier. The primary ones to remember are FPIC and the right to their culture. This can obviously manifest in various ways, but significant issues here are the close connection of indigenous people to their land and traditional ways of living. Often these rights are violated by companies and infrastructure projects, the relentless onslaught of energy companies being amongst them when natural resources are there to be harvested in indigenous lands. While there has been a long history of fossil fuel companies clashing with local and indigenous communities, it appears that renewable companies have followed the path into the same controversies.

Before her murder, indigenous activist Berta Caceres wrote a letter to the UN Special Rapporteur on the rights of indigenous peoples. In this letter she urged the Rapporteur to visit her community in Honduras, to investigate "the severe violation of individual and collective human rights of indigenous peoples" in the country that they perceived from the development of the Agua Zarca hydroelectric dam by the company Desarrollos Energéticos S.A. (DESA). Five months later, she was shot and killed in her home. Five men were charged with her murder, two of them with links to DESA.[218]

In the Isthmus of Tehauntepec in Oaxaca, Mexico, indigenous women's rights defender Bettina Cruz has been arrested and subjected to violence and death threats for her opposition to wind farms.

[216] Ghaleigh. "Barriers to Climate Technology Transfer - The Chimera of Intellectual Property Rights" (2011). *Carbon and Climate Law Review* 2011(2), 228
[217] Ibid, 228-229
[218] Calma. "Renewable energy is violating human rights as much as fossil fuels have for decades" (2016). *Quartz.*

Local communities allege that these farms were built without the FPIC of affected residents. These residents are now experiencing harm to their livelihoods and food security following the loss of agricultural land and pollution of fishing waters.[219]

These are not isolated incidents but represent a problematic trend in the deployment of renewable energy, especially in large-scale renewable infrastructure projects, that does not properly consider human rights provisions. The BHRRC reports that "Renewable energy projects, including dams and wind farms are associated with serious human rights abuses including in Central and South America, East Africa and Southeast Asia. Local communities are faced with some of the most damaging impacts including dispossession of their lands, livelihoods undermined, threats and intimidation, killings, displacement, among other abuses."[220] When the BRHRRC surveyed 50 renewable energy companies, only five responded that they were committed to upholding the standard of FPIC. Three of these five, including DESA, have allegations against them that claim the companies did not adequately consult and obtain consent from local communities. The distinction between consultation and consent is key here: meaningful FPIC goes beyond discussions with the local population and requires the community to agree to and give consent for the development of the project which may require the company to amend development plans and provide adequate compensation.[221]

In many cases, these problems have arisen in the global South as joint implementation tools established under the Kyoto Protocol, such as the CDM, provide incentives for nations of the global North to offset their GHG emissions by investing in carbon sequestration and renewable energy projects in developing countries. "These projects, like massive monocultural plantations for palm oil production, have constituted part of the "land-grabbing" phenomenon through which foreign corporations take control of land that had been used by local peoples."[222]

The CDM is quite problematic in its application but is a widely used and lauded tool for increasing mitigation action. Industrialized nations finance mitigation in developing countries because it is less expensive than cutting domestic emissions, and host countries accept as it provides an opportunity to capture foreign investment. Only about 60% of CDM projects produce renewable energy

[219] Horvath and Dobson. "Putting human rights at the centre of the renewable energy sector" (2017). *Open Global Rights.*
[220] Business and Human Rights Resource Centre. (n171), 1
[221] Ibid, 5
[222] Scott and Smith (n50), 373

and the largest number of CDM projects are in hydropower.[223] While CDM executives say that only a couple of projects out of thousands have allegations of human rights violations, representatives of watchdog NGOs like Carbon Market Watch say that this claim is inaccurate.[224] Unfortunately, there is no complete list of CDM projects that have human rights allegations against them available. "The main problem with the CDM has always been that it lacks effective safeguards to ensure that human rights are taken into account" says Knox, and with millions (if not billions) at stake in CDM projects, it is no surprise that these transactions might be slowed or even undermined by adding local human rights requirements into the mix.[225] And when indigenous peoples oppose these development projects, they become targets of state violence.[226]

Hydroelectric dams' status as a form of "clean" energy production has long been challenged as silt and organic materials in the reservoirs' depths produce toxic and climate-altering methane gas, among other environmental damage as well causing human displacements for which dams have become so infamous.[227] Some argue that these displacements constitute a different type of climate refugee, one that is not the victim of rising sea levels but of actions to prevent that, further complicated when planned relocation of these people are carried out by multinational development banks with limited capacity to fully implement proper resettlement that maintains their communities and restores their living standards.[228] But what these resettlement plans tend to ignore is the deep connection that indigenous peoples have with *their* land. The indigenous peoples of the Peace Valley, where the Canadian Site C dam is planned, invoke the characteristics of unique places with spiritual and cultural significance for them- discussing how fishing is a traditional practice that depends on specific places, species, and means and how these specific fishing spots are crucial to the community's cultural and subsistence activities. Their traditional practices of gathering berries and sacred medicines, holding ceremonies and visiting ancestral burial grounds cannot be resettled.[229]

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[223] Finley-Brook and Thomas. "Renewable Energy and Human Rights Violations: Illustrative Cases from Indigenous Territories in Panama" in Zimmerer (ed) "The New Geographies of Energy: Assessment and Analysis of Critical Landscapes" (2013), 163-164

[224] Catanoso. "Climate negotiators focus on carbon credits, underplay human rights" (2016). *Mongabay.*

[225] Ibid

[226] Finley-Brook and Thomas (n223), 164

[227] Howe. "Latin America in the Anthropocene: Energy Transitions and Climate Change Mitigations" (2015). *Journal of Latin American and Caribbean Anthropology,* 20(2), 239

[228] Scott and Smith. (n50), 377

[229] Ibid, 379

The renewables rush is necessary and should be welcomed as an effective measure to mitigate climate change. But at the same time, human rights obligations toward protecting the rights of indigenous peoples' dictate that climate mitigation projects should not come at the cost of local populations and safeguards must be put in place to protect vulnerable communities, such as indigenous peoples. Renewable companies and CDM projects alike should be doing more to collect the FPIC of local communities. Otherwise, the same issues with fossil fuel extraction will continue to plague vulnerable populations.

Chapter 5: Cross-Cutting Issues and Conclusion

While the previous chapter outlined the connections between the sustainable energy transition and specific substantive human rights, there are some cross-cutting issues that must be considered in order to paint a complete picture of the nexus between the energy transition and human rights. This chapter will briefly outline some of the inter-connections as they relate to gender equality, equity between states and the potential environmental and human rights effects of extractive industries that will still be necessary to support the transition to renewable energy.

Gender Equality

While the potential impacts of climate change are harmful to everyone, women are especially vulnerable. Climate change amplifies gender disparities. Women are 14 times more likely to die in a natural disaster and are less able to adapt to physical hazards like extreme weather events, flooding, drought, and changes in disease vectors. For example, the 1991 cyclone in Bangladesh killed nearly 150,000 people, 90% of whom were women.[230] Due to unequal access to resources and decision-making processes, women in rural areas are disproportionately affected by climate change and have limited mobility in times of disaster. As a result, it is important to identify gender-sensitive strategies to respond to climate crises.[231] These is by no means an exhaustive list of how climate change can have devastating effects on the welfare of women. However, women should not be thought of as merely vulnerable victims, they can also be agents of change with important perspectives and knowledge which can inform climate action to better consider the needs of women.[232]

In rural areas in developing countries, much of the household thermal energy use is for cooking. Most of this energy currently comes from traditional biofuels such as wood, charcoal and agricultural wastes, and the collecting and managing of these fuels is traditionally the business of women. With environmental degradation, women must travel greater distances and devote more time toward fuel collection. [233] Access to sustainable energy would thus eliminate the need for fuel collection, leaving

[230] Harris. "Women and Climate Change: Disproportionately Affected but Powerful Agents of Change" (2016), *Business for Social Responsibility.*
[231] UN Women. "Women, Gender Equality and Climate Change Factsheet" (2009), 1
[232] Alam et al. (n19), 11
[233] UN Women. (n231), 7

women and girls with more time for productive activities, allowing for more access to income and economic development.[234] Furthermore, exposure to the combustion of such biofuels means exposure to greater levels of indoor air pollution. As a result, it is important for women to have access to cleaner energy and appliances, especially cookstoves. It is thus imperative for the deployment of cleantech to consider women's specific priorities and needs, and to use their indigenous knowledge, to ensure more effective, user-friendly technological development design, especially when women are going to be the ones to primarily use this technology.

In addition, women should have the same access to training, credit and skills-development to ensure their full participation. Several initiatives are doing this already with positive results. To cite one example, Grameen Shakti, a non-profit founded by the Grameen Bank, has supported the installation of nearly 800,000 solar home units in Bangladesh by training women as solar technicians who then sign annual contracts with homeowners to maintain and service solar units while also providing jobs to manufacture accessories for solar home systems. More than 1,000 women have been fully trained in these facilities, and thousands more have played related roles in solar construction and installation. The solar jobs created by Grameen Shakti have, at once, reduced energy poverty and made many of these women the primary wage earners in their families, allowing women to gain economic independence while providing power to those living in energy poverty. [235]

The success of the energy transition in reaching the most vulnerable will require the participation of women, who in many cases are the most vulnerable. To use their knowledge and perspective in the design and implementation of mitigation measures will ensure a fairer, more accessible energy transition while simultaneously helping women overcome systemic barriers to economic independence and participation in decision-making.

Equity Between States

Mitigating climate change requires the reduction of GHG emissions globally, but at the same time, for developing countries to develop, their emissions will inevitably rise. This can seem contradictory. Should the impending danger of climate change mean that developing countries should be stunted on their development trajectory? The answer simply is no, especially as leaving the developing world in energy

[234] Alam et al. (n19), 39
[235] Ibid, 40

poverty would go against the doctrine of sustainable development as well as leading to grievous human rights violations in a changing climate reality. Additionally, the developing world has contributed very little to historic emissions that have led us down this path of anthropocentric climate change, so why should they have to be the ones to sacrifice in order to mitigate it?

One way of understanding how to create equitable mitigation strategies is to think about it in terms of subsistence emissions versus luxury emissions. As Shue puts it "Even in an emergency one pawns the jewellery before selling the blankets …. Whatever justice may positively require, it does not permit that poor nations be told to sell their blankets [compromise their development strategies] in order that the rich nations keep their jewellery [continue their unsustainable lifestyles]."[236] For equity to be achieved in climate action between those historically responsible and possessing greater wealth and capacity, and those who have contributed little to the predicament and possess much less wealth and capacity to mitigate, developing states should not have to sacrifice their development so that developing countries can maintain their business-as-usual approach. To their credit, the international climate regime has always attempted to consider this, especially in their utilization of CBDR to ensure greater equity between developing and developed states.

This is where a sustainable energy transition can play a pivotal role. To escape poverty, people need to use more energy, but using more energy equates to producing more emissions only if no source of energy except fossil fuels are accessible and affordable for them. Making alternative, cleaner energy accessible and affordable for the poorest populations would mean that there would be no need for subsistence allowances for emissions or a debate over mitigation responsibility of developing states.[237]

Climate finance will play a crucial role in making clean energy available to developing states, and the climate regime will have to play a role in mobilizing the downstream movement of capital from developed states to developing states. Developing states must continue to take the lead in reducing their own domestic emissions but insofar as those reductions do not fully discharge their overall mitigation obligation, they should provide financial transfers to poorer countries where reductions are economically viable. Subsistence emissions stop being necessary when financial transfers from wealthy nations have made non-carbon energy affordable and accessible in poor nations. When adequate non-carbon energy is both affordable and accessible, no one will need to generate carbon emissions in

[236] Shue. "Subsistence protection and mitigation ambition: Necessities, economic and climatic" (2019). *British Journal of Politics and International Relations,* 21(2), 252
[237] Ibid, 253-254

order to provide for subsistence.[238] Thus, the widespread dissemination of renewable energy can play a major role in both lifting people out of poverty and encouraging development, as well as ensuring a more equitable burden of global climate action.

Extractive Industries

One final consideration that must be made in the discussion regarding sustainable energy transitions is about extractive industries. While renewable energy seems to present us with a possibility for unlimited, clean energy with effectively zero emissions, it is too good to be true. Ramping up deployment of renewables will involve a massive quantity of natural resources and extractive industries to provide them. Increasing production of the technology and parts that are used to harness energy will require extensive mining for rare earth elements and other metals.

In 2017, the World Bank modelled the increase in material extraction that would be required to build enough solar and wind utilities to produce an annual output of 7 terawatts of electricity by 2050, which would power roughly half the global economy. From those figures, if we were to achieve zero emissions, we would need a staggering 34 million metric tons of copper, 40 million tons of lead, 50 million tons of zinc, 162 million tons of aluminium, and no less than 4.8 billion tons of iron.[239] In many cases, extraction will have to increase beyond our current levels. Neodymium extraction, used in wind turbines, will have to increase by 35%; silver, essential for solar technology, by anywhere between 38 to 105%; indium, also used for solar, by 920%; and lithium, still the best battery technology we have, by an eye-watering 2700%.[240] The issue here is not that we will run out of these elements, but the damage from mining and extraction. Firstly, rare earth ores often contain radioactive elements like uranium, and the by-products of the extraction process include dangerous gases and radioactive wastewater, which is usually stored in tailings ponds. As a result, the extraction process can cause serious health risks such as increased risk of developing lung, pancreatic, and other cancers and cause environmental damage due to the acid and radioactive waste by-products created from the mining process.[241] Secondly, is the scale of the operations required. Mining is one of the biggest single drivers of deforestation, ecosystem collapse, and biodiversity loss around the world and ecologists estimate

[238] Ibid, 258
[239] Hickel. "The Limits of Clean Energy". (2019). *Foreign Policy.*
[240] Ibid.
[241] Turner. "The Green New Deal is missing some vital elements—and will fail without them" (2019). *Quartz.*

that even at present rates of global material use, we are overshooting sustainable levels by 82%.[242] Consider the example of lithium. It takes 500,000 gallons of water to produce a single ton of lithium. Even at present levels of extraction this is causing problems - in the Andes, where most of the world's lithium is located, mining companies are burning through the water tables and leaving farmers with nothing to irrigate their crops.[243]

Even in service to renewable energy production, extractivism ultimately depends upon the appropriation and exploitation of ecological resources.[244] The potential for environmental damage and a reliance on international capital markets is scarily reminiscent of many of the issues and injustices that surround fossil fuel extraction today and historically. A just energy transition will require changes in the way we extract natural resources to prevent a new scramble for resources where developing countries may become subject to a familiar form of resource exploitative colonialism.

Conclusion

The Paris Agreement ushered in the beginning of a new era of renewed enthusiasm and vigour in climate action. Climate change will fundamentally change human society as we know it and represents the single largest threat to the protection of human rights worldwide. Climate action has historically been disappointing, but we do not have a choice anymore. Action must be taken swiftly and decisively if humanity is to survive. We will have no choice but to adapt to a new climate reality, but we must try to minimize the effects of this harsh new world by aggressively pursuing climate mitigation. The Paris Agreement will not be enough. It represents a start, not an end.

The international climate regime's success will have significant impacts on human rights around the world. As a result, one mention in the preamble of Paris is not enough. Both the climate regime and the human rights regime must strive for greater integration. This paper attempted to shed light on the nexus of these two legal regimes. Human rights law can ensure that climate action is carried out in a way that puts people first and protects their rights. The extraterritorial nature of trandsboundary pollution and GHG emissions makes it difficult to litigate but the longstanding obligations for international cooperation and assistance present in the human rights jurisprudence could serve to not only reinforce the need for developed states to help developing states in mitigation and adaptation, but also to commit

[242] Hickel (n239).
[243] Ibid.
[244] Howe (n227), 234

and implement their own reductions obligations. The tools of international human rights law, procedural guarantees of remedy, consultation, participation and avenues for litigation will play an important role in holding states and companies to account for their climate obligations. The protection of those at the frontline of the climate crisis is currently underdeveloped in international law, and only a concerted effort by both regimes could help solidify it.

Central to climate mitigation is the sustainable energy transition. This involves a widespread shift away from fossil fuels toward cleaner, less carbon emitting fuels such as solar, wind, hydropower, etc. But the energy transition is not just about fuel. It is also about increasing efficiency, innovating new distribution systems and ending energy poverty. The energy transition's relationship with human rights is another area of focus that will require much greater attention and scholarship in the coming years. This paper looked at how it affects a few different substantive rights: the rights to health, work, housing, science and indigenous peoples' rights. Pollution remains a major health concern and shifting away from fossil fuel combustion will help improve the underlying determinants of health. Similarly, deployments of decentralised energy systems and moving away from a reliance on grid-based power can help deliver healthcare to remote, rural areas where people are deprived. The same logic applies to housing where off-grid renewable energy systems can help fulfil the right to housing by increasing access of basic energy services. The right to work must be considered as we restructure our currently carbon-based economy. Jobs in fossil fuel sectors will be lost, but there will be new opportunities in clean energy sectors. States have an obligation to help prepare their workforce for this transition by providing retraining programs, access to education and information, and vocational training. The right to science can help facilitate the climate regime's obligations on transfer of technology and capacity building for research and development in developing countries, helping foster a new intelligent economy based around clean, efficient technologies. It is however imperative that restrictive intellectual property regimes do not hinder this. Finally, the renewables rush must consider the needs and welfare of the local populations that mitigation measures and infrastructure deployment will affect. Indigenous people are historically marginalised and vulnerable, and more must be done to ensure that climate action measures and renewable energy companies do their utmost to obtain the free, prior and informed consent of these indigenous communities, recognizing the intimate and deep connection they share with the land. International project implementation mechanisms such as the CDM must ensure that they establish proper safeguards to protect against the violation of human rights.

Gender too will play a role. The renewable energy rush has an opportunity to further the economic and social development of women, and at the same time, can benefit greatly by utilising the indigenous knowledge of women in designing mitigation measures and clean energy solutions. Increasing participation for women will be paramount toward creating effective, accessible and affordable clean energy solutions.

Climate mitigation must also not serve as an excuse to prevent the development pathways of developing states. They have not been the ones to contribute greatly to historic emissions, as developed states have. Developed states as a result must take on the onus of leadership in reducing emissions. The climate regime has long recognised this as shown in its adoption of the CBDR principle. Subsistence is a necessity and energy should not be deprived to those just trying to survive. Here again the sustainable energy transition can help promote equity between states. If non carbon-based fuels were readily available, the development pathways of developing countries need not actually result in greatly increased emissions. Developed states thus must facilitate the downstream mobilization of capital and technology to support energy transitions in developing countries so they can develop in a more environmentally friendly way than the so-called first world did.

Extractive industries too will pose a problem in the future and more research must be done to prolong renewable technology lifecycles, recycling essential rare earth elements and other minerals, effective waste management and new, more productive methods of extraction to minimize the environmental and health costs of such operation. Similarly, battery technology represents another frontier that must be pushed along with the efficiency of renewable energy production. Decentralised and off-grid solutions must also be invested in as they represent more sensible, cost-effective and timely interventions for those living in energy poverty. The energy transition is now irreversibly in motion. Human rights must consider how best to deal with the challenges and opportunities of such a fundamental restructuring of our global political, economic and social structure.

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