

**GAME OF TONES: A TWAIL-ANALYSIS OF THE
EVOLUTION AND IMPACTS OF THE UNITED NATIONS
FRAMEWORK CONVENTION ON CLIMATE CHANGE
TECHNOLOGY TRANSFER REGIME IN AFRICA**

By

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DEDICATION

This thesis is dedicated to:

- God who made all things bright and beautiful;
- Everyone who crusades to keep them so.

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Abstract

The 1992 Rio Outcome articulates what is arguably, to date, the most ambitious North – South environmentally sound technology (EST) transfer aspirations. Yet, 26 years post-Rio, Africa remains at the lowest rung of the global EST deployment totem. Departing from talking-points like the connection of EST transfer and intellectual property rights, this research focuses on the normative underpinnings of the history, processes and dynamics of UNFCCC’s EST transfer regime. Using a ‘reconsidered’ Third World Approach to International Law approach and its accompanying historical research methodology, the thesis seeks to track landmarks in UNFCCC’s EST transfer regime evolution and the impacts of a globally commodified climate change structure on EST transfer in Africa. It further considers how previous trends are being reproduced and reiterated in the current regime under the Paris Agreement. It concludes by framing a five-point research agenda for the reformation of the UNFCCC-led global EST development and transfer regime.

List of Abbreviations Used

APA – Ad Hoc Working Group on the Paris Agreement

APP – Ability to Pay Principle

BASIC – Brazil, South Africa, India and China

BPP – Beneficiary Pays Principle

CBDR/RC/NC – Common but Differentiated Responsibilities with Respective Capacity in the light of different National Circumstances

CDM – Clean Development Mechanism

CERN – European Council for Nuclear Research

CET – Clean Energy Technology

CGIAR – Consultative Group on International Agricultural Research

CMA – Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement.

COP – Conference of Parties

CTCN – Climate Technology Center and Network

EGTT – Expert Group on Technology Transfer

EST – Environmentally Sound Technology

FM – Financial Mechanism

G77 – Group of 77

GCF – Green Climate Fund

GEF – Global Environment Facility

GHGs – Greenhouse Gases

GPG – Global Public Good

ICCTT – Draft International Code of Conduct for Technology Transfer

ICESCR – International Covenant on Economic, Social and Cultural Rights

ICHRP – International Council on Human Rights Policy

IEA – International Energy Agency

IPCC – Intergovernmental Panel on Climate Change

IPR – Intellectual Property Rights

IRENA – International Renewable Energy Agency

MEA – Multilateral Environmental Agreements
NDA – National Designated Authority
NDC – Nationally Determined Contributions
NDE – National Designated Entity
NSI – National Systems of Innovation
ODA – Official Development Assistance
PA – Paris Agreement
PCCB – Paris Committee on Capacity Building
PPP – Polluter Pays Principle
PSP – Poznan Strategy Programme in Technology Transfer
RD & D – Research, Development and Demonstration
SBI – Subsidiary Body on Implementation
SBSTA – Subsidiary Body on Scientific and Technological Advice
SSTC – South-South and Triangular Cooperation Programme
TEC – Technology Executive Committee
TF – Technology Framework
TM – Technology Mechanism
TNA – Technology Needs Assessment
TNC – Transnational Company
TRIPS – Trade Related Aspects of Intellectual Property Rights
TSI – Transnational System of Innovation
TT – Technology Transfer
TWAIL – Third World Approaches to International Law
UNCED – United Nations Conference on Environment and Development
UNEP – United Nations Environment Programme
UNFCCC – United Nations Framework Convention on Climate Change
WTO – World Trade Organization

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Thank you!

CHAPTER 1: INTRODUCTION

1.1 Purpose and Rationale of Thesis

This thesis attempts a normative rethink of the technology transfer framework under the international climate change regime. It seeks to critique and reimagine the structure(s), process(es), dynamics and impact(s) of the United Nations Framework Convention on Climate Change (UNFCCC) technology transfer regime on environmentally sound technologies (ESTs), with select African States as case studies. The foregoing overarching research objectives mandate an understanding of not just the current transfer structure and processes of the UNFCCC EST transfer regime, but also how it evolved and a consideration of the nuanced differences and similarities in its diverse phases.

The causal and corrective connections between technology and the environment have long been recognized. The 1972 Stockholm Declaration, for example, while in one breath indicting technological advancement and industrialization as key causes of environmental degradation, in another breath referenced technology and science as remedies thereto.¹ Similarly, the Intergovernmental Panel on Climate Change (IPCC) noted that “technology is among the central driving forces of GHG emissions ... At the same time, technology and technological change offer the main possibilities for reducing future emissions and achieving the eventual stabilization of atmospheric concentrations of (Greenhouse Gases) GHGs”.² More gravely, it has been stated that given the existential risks posed by climate change, mankind’s “survival depends on our improvement of technology”.³ To others, however, only a radical global normative and attitudinal shift can salvage the world from its current precipice.⁴ This thesis fuses these seemingly contradictory positions to argue that climate change mandates a norm-based approach to the development, deployment and management of ESTs.

¹ See generally The Declaration of the United Nations Conference on the Human Environment, 1972, principles 9, 18, 20 and preamble. (Stockholm Declaration).

² Working Group III Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, *Climate Change 2007: Mitigation of Climate Change*, (Cambridge: Cambridge University Press, 2007) 218.

³ Christiana Figueres, former Secretary General to the United Nations Framework Convention on Climate Change (UNFCCC) quoted by Catherine Suez, “Human Survival Depends on Shared Technology, Says New UN Climate Chief” *Intellectual Property Watch* (3 September 2010) online: <https://www.ip-watch.org/2010/09/03/human-survival-depends-on-technology-says-new-un-climate-chief/>.

⁴ See for example: Felix Creutzig et al, “Beyond Technology: Demand-Side Solutions for Climate Change Mitigation” (2016) 41:1 *Annu Rev Environ Resour* 173, online: <<http://www.annualreviews.org/doi/10.1146/annurev-environ-110615-085428>>; Francesca Pongiglione & Jan Cherlet, “The Social and Behavioral Dimensions of Climate Change: Fundamental but Disregarded?” (2015) 46:2 *J Gen Philos Sci* 383.

The centrality of technology to climate change is duly accented by the emphasis placed on it in the first major international instrument on climate change – the 1992 UNFCCC. For instance, the UNFCCC explicitly tied the implementation of developing countries’ commitment under the climate regime to the level of access they have to finance and technology.⁵ It is this connection between technological access and the attainment of global climate change aspirations that informed the assertion made by some that “technology is the *quid pro quo* of global solidarity on climate change”.⁶ Put more explicitly, the UNFCCC “...was built on a fundamental political bargain directly involving technology transfer.”⁷ Indeed, this *quid pro quo* arrangement firmly rests on the commitment that:

The developed country parties ... shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other parties, particularly developing country parties, to enable them to implement the provisions of the Convention. In this process, the developed country parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.⁸

The above provision is referred to in this work as ‘the technology transfer pact’.⁹

Africa is a ‘first-hand witness to the failure of the EST transfer pact. While contributing the least to global emissions,¹⁰ the continent is the world’s most vulnerable continent to climate change¹¹ and has about the least capacity to either combat the effects of climate change or mitigate the cause.¹² The

⁵ *United Nations Framework Convention on Climate Change* 9 May 1992, 1771 UNTS 30822, art 4(7) (entered into force 21 March 1994) (UNFCCC).

⁶ International Council on Human Rights Policy (ICHRP), *Beyond Technology Transfer: Protecting Human Rights in a Climate-Constrained World* (Geneva: ICHRP, 2011) xiv.

⁷ Dalindyabo Shabalala, “Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility but Common but Differentiated Responsibilities” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016) 172.

⁸ UNFCCC, art 4(5).

⁹ This pact While art. 4(5) of the UNFCCC did not explicitly mention ‘obligation to transfer technology’, it is argued that the obligations to ‘promote, facilitate and finance’ equal an ‘obligation to transfer’. As noted elsewhere, “although the wording in UNFCCC Article 4.5 is somewhat ambiguous, it would appear to indicate that the parties listed in the shorter Annex 2 – at the minimum – owe the obligation to transfer technology”. See ICHRP, *supra* note 6 at 34.

¹⁰ Africa is said to contribute about 3.6% of the global GHG emissions. See Amadou Sy, “Africa: Financing Adaptation and Mitigation in the World’s Most Vulnerable Region” (2016) online: <https://www.brookings.edu/wp-content/uploads/2016/08/global_20160818_cop21_africa.pdf>.

¹¹ “United Nations Fact Sheet on Climate Change” online: <http://unfccc.int/files/press/backgrounders/application/pdf/factsheet_africa.pdf>; Olivia Serdeczny et al, “Climate Change Impacts in Sub-Saharan Africa: from Physical Changes to their Social Repercussions” (2015) 15:8 *Regional Environmental Change*, 1; Isabelle Niang et al, “Africa” in Christopher Field et al, eds, *Impacts, Adaptation, and Vulnerability Part A: Global and Sectoral Aspects*, (New York: Cambridge University Press, 2014) 1205.

¹² Damilola Olawuyi, “From Technology Transfer to Technology Absorption: Addressing Climate Change Technology Gaps in Africa” (2017) *Journal of Energy & Natural Resources Law*, DOI: 10.1080/02646811.2017.1379667 at 6.

risks faced by the region have been listed to include “shifts in biome distribution, loss of coral reefs, reduced crop productivity, adverse effects on livestock, vector- and water-borne diseases, undernutrition, and migration”.¹³ Beyond these adaptation-oriented risks are the continent’s developmental challenges. The energy deficit experienced on the continent is indicative of and contributory to these developmental challenges. A direct correlation has been drawn between this state of acute energy poverty and not only the underdeveloped economy of Sub-Saharan Africa, but also the health, education and overall wellbeing of its people.¹⁴ According to the International Energy Agency (IEA), as of 2014, about 620 million of Africa’s 915 million population are without access to electricity and nearly 730 million depend on solid biomass for cooking.¹⁵

The dearth of ESTs in Africa, despite the dire needs of the continent, has been the subject of research over the years. As will be shown shortly, these studies have largely focused on EST transfer as an intellectual property rights (IPR) concern. This emphasis is not without justification. For one, the connection between technology transfer and IPR has been one of the most drawn-out contentions between developing and developed countries from the inception of the climate change regime.¹⁶ While developing countries generally view IPR as inhibitory to EST transfer, developed States represent it as facilitative.¹⁷ However, beyond the narrowness of the IPR debate, is what it denotes about the underpinning of the global EST construct, that is, its market-centricity. This is why the IPR debate has been reframed as being about developed countries favouring “an approach that exclusively promotes markets through enabling environments” while developing countries favour non-market dependent approaches.¹⁸ The inability of developing countries, particularly African States, to access ESTs is traceable to this market-focused approach. An author made this point thus:

...where technology is held through IP, rights-holders are typically interested in selling their knowledge and technology at a certain price in a market with sufficient purchasing power. Thus, developing countries face a twofold problem: they do not present sufficient markets for private

¹³ Niang et al, *supra* note 11 at 1204.

¹⁴ International Energy Agency, *Africa Energy Outlook: A focus on Energy Prospects in Sub-Saharan Africa*, (2014). online: <https://www.iea.org/publications/freepublications/publication/WEO2014_AfricaEnergyOutlook.pdf> at 27

¹⁵ *Ibid* at 19.

¹⁶ Carlos Correa, “Intellectual Property Rights under the UNFCCC: Without Response to Developing Countries’ Concerns” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016) 74.

¹⁷ Ahmed Abdel Latif, et al, “Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward” (2011) 11 ICTSD Programme on Innovation, Technology and Intellectual Property, 2 – 3.

¹⁸ Heleen de Coninck and Ambuj Sagar, “Technology Development and Transfer (Article 10)” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 258 at 262.

actors to develop technologies to serve their needs; and where technologies exist and are protected by IP, they do not present sufficient markets for right-holders to sell or licence their technologies.¹⁹

This thesis contends, in part, that the commodification of the global EST regime and its overall neo-liberal underpinning has left developing (African) States with the shorter end of the stick. This argument is linked to the broader theme of the dangers of the objectification and commercialization of the climate change cause.²⁰ It further argues that the focus on IPRs, regulatory and legal barriers in developing countries in the EST transfer discourse, while not without merit, distracts from the core problem of the transfer regime “which is simply a failure to systematically pursue the technology provisions of the UNFCCC ... the failure (of developed countries in particular) to produce a policy and mechanism to facilitate technology transfer”.²¹

The point must be made clearly that this work’s focus on the international dimension of the global EST transfer matrix does not detract from the need to address allied concerns like the necessity of an enabling environment in developing States or the involvement of non-State parties in transfer initiatives. However, it contends that the need to steer the global EST regime away from developed States’ emphasis on a neo-liberal and market-oriented construct is a stand-alone problem that must be addressed. Host-State initiatives are inherently assimilative; they are meant to facilitate effective local diffusion of effectively transferred technologies. Logically, if technologies are not transferred, an assimilation phase will be needless. While the focus of this research is on African States, its implications are global. The underlying objectives and contentions of this research speak to the daunting existential demands of climate change and the consequential imperatives of de-prioritizing economic considerations in the international EST transfer framework for the (global) public good.

1.2 Research Questions

Existing studies have approached the subject of EST transfer regime’s ineffectiveness from diverse perspectives. These viewpoints can be broadly grouped into market-oriented and normative research,

¹⁹ Shabalala, *supra* note 7 at 174.

²⁰ B.S. Chimni, “The Past, Present and Future of International Law: A Critical Third World Approach” (2007) 8 *Melbourne Journal of International Law* 499 at 504. Also see generally Adrian Parr, *The Wrath of Capital: Neoliberalism and Climate Change Politics* (New York: Columbia University Press, 2013)

²¹ ICHRP, *supra* note 6 at xiv, 60.

with most scholarly works under the former.²² While also focused on the interrogation of the reasons for the ineffectiveness of the EST transfer framework under the UNFCCC regime, the questions sought to be answered in this research align more with the normative genre of studies on the subject.

The questions include:

- i. How has the UNFCCC-coordinated EST transfer regime evolved?
- ii. How has the resistance of developing States to the neo-liberally structured global EST framework evolved?
- iii. How has the UNFCCC institutional design, policy framework and transfer initiatives impacted developing countries' access to ESTs?
- iv. To what extent does the extant EST transfer framework under the Paris Agreement reproduce past trends and what are the prospective impacts of such iterations?
- v. How can the international EST framework be reformed into an effective, efficient and equitable regime?

The questions, approaches, and claims engaged in this thesis are informed by the theoretical outlook provided by Third World Approaches to International Law (TWAIL), a theory which aptly grounds the presumptions, contentions and recommendations contained in this work. There is no research known to this writer which has studied the global EST transfer regime in the light of the above questions. Neither is there any known work where the subject of EST transfer has been considered from a TWAIL perspective.

1.3 Research Methodology: Approaches and Method

It is not commonplace for scholarly works on climate change law to contain segments or chapters explicitly laying out a methodological framework. A cursory review of two recent climate change law/policy related texts entailing a compilation of articles from various authors exemplify this point.²³ None of the 56 chapters in both publications made either a deliberate or an overt attempt to make bare their methodological constructs.²⁴ Although an interrogation of this trend is outside the scope of this

²² Research on IPRs and patents, endogenous capacity building, public-private partnerships, non-state party initiatives, etc., are generally subsumed under the market-oriented category, while studies on human rights and technology transfer, theoretical underpinnings of EST transfer, etc., are categorised as non-market based.

²³ Daniel Klein, et al, eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) and Cinnamon Carlarne, et al, eds, *The Oxford Handbook of International Climate Change Law* (Oxford: Oxford University Press, 2016).

²⁴ This point is only illustrative and does not imply that the referenced well researched works do not to varying levels have ingrained in them some methodological themes. It only illustrates the absence of clearly delineated methodological segment clearly and comprehensively spelling out the 'how' and 'why' of the works. Making methodological choices, explicit, is necessary for "self- and peer – scrutiny" for the legitimization of intellectual endeavours and demonstration of "challenging scholarly choices that we confront and make". See Elizabeth Fisher et al, eds., "Maturity and Methodology: Starting a Debate about Environmental Law Scholarship" (2009) 21:2 *Journal of Environmental Law* 213 at 244.

work, it is necessary to note that this seems to be the general inclination in environmental law. Since climate change law is essentially a sub-set of environmental law,²⁵ the criticism that environmental law scholarship is generally perceived as immature and less of an intellectual discipline due to “lack of explicit and widespread discussion about methodology” is apt.²⁶ Methodology has been variously defined as “a systematic procedure that a scholar applies as part of an intellectual enterprise” and “a way to systematically solve (a) research problem ... various steps ... adopted by a researcher in studying his research problem along with the logic behind them”.²⁷ According to Fisher et al, while methodology is informed by the research questions asked, the questions are also informed by “implicit or explicit methodological perspectives”.²⁸

Some of the central hypotheses of this work include: (1) the most debilitating flaw of the global EST transfer regime is the prioritization of monetarism²⁹ over environmentalism³⁰ and humanism; (2) the UNFCCC EST transfer set-up and policies are more symbolical than functional; and (3) except ‘de-

²⁵ Although this view is a subject of ongoing scholarly contentions, the position taken in this work aligns more with Chris Hilson’s concept of ‘climate unexceptionalism’, that is, that ‘core’ similarities between climate change law and environmental law, blur absolute demarcations between both fields. See Chris Hilson, “It’s All About Climate Change, Stupid! Exploring the Relationship Between Environmental Law and Climate Law” (2013) 25:3 *Journal of Environmental Law* 359 at 362.

²⁶ Fisher et al, eds., *Supra* note 24 at 214, 218. Some of the challenges of environmental law researchers giving rise to this state of affairs include: the speed and scale of regulatory change, the interdisciplinary nature of the subject, heavy reliance on “a diverse range of governance arrangements” and “tackling the multijurisdictional nature of the subject”. The writers further identified “the intellectual incoherence of environmental law as a subject, the perceived marginality of environmental law scholarship in the legal academy, the poor quality of some environmental law scholarship and the sheer difficulty of carrying out environmental law scholarship” as reasons for the persistence of the “immature image of environmental”. *Supra* note 24 at 215, 219.

²⁷ Fisher et al, *supra* note 24 at 226 and C.R. Kothari, *Research Methodology: Methods and Techniques, 2nd edn* (New Delhi: New Age, 2004) 8. Again, methodology has been used in different contexts, while some have differentiated between methodology, methods, theory and approach, others have inferred their synonymousness. See Robert Cryer, et al, *Research Methodologies in EU and International Law* (Oxford: HART Publishing, 2011) 5. In this work, a distinction is recognized between methodology as a collective term for methods, approaches and theories. While methods largely engage ‘empirical’ tools and with more specific research implications (e.g. quantitative or qualitative research), approach is construed as a broader perspectival research frame informing the direction of a research (e.g. historical, comparative, interdisciplinary or doctrinal approach), and theory deals with “underlying presumptions ... definitional boundaries ... and preferred justifications (for an) intellectual phenomenon”. See Richard Devlin, “The Charter and Anglophone Legal Theory” (1997 - 1998) 4:1 *Rev of Const Stud* 19 at 22.

²⁸ Fisher et al, *supra* note 24 at 244.

²⁹ While ‘monetarism’ has a technical meaning as prognosticated by Milton Friedman, it is used in this work to mean the emphasis placed on return on investment as the chief determinant on policies and/or initiatives in respect of EST transfer.

³⁰ As against being descriptive of actions of a defined set of environmental activists, environmentalism here is used as a worldview which puts premium on the environment over profiteering in the transfer of ESTs. It fits more with what has been classified as “the first wave of environmentalism” with its strong normative underpinning, than with the second or third waves which focus on ‘regulation’ or ‘investment’. See Michael Shellinberger & Ted Nordhaus, “The Death of Environmentalism: Global Warming Politics in a Post-Environmental World” (2004) online: <https://www.thebreakthrough.org/images/Death_of_Environmentalism.pdf>.

monetized’ and ‘un-neo-liberalised’, the UNFCCC will remain ineffective in the bid to transfer ESTs to developing States.

The above hypotheses stem from the view that there is a need to shift the climate discourse from the current market frame to a more normative context. While conversations around climate change have largely centred on ‘emission reduction targets’, ‘climate policies’, and ‘mannequin’ principles like CBDR, the more vital questions on necessary normative paradigm shifts have barely been asked. As put elsewhere, we skipped “the stages of debate over fundamentals ...” and “went directly to the important, but narrower, question about the merits of the suite of policy instruments”.³¹ These hypotheses will be subsequently tested in this thesis.

Consistent with the first and second research questions (on page 5) on the evolution of the global EST structure and third world resistance thereto, this work draws heavily on the historical approach to legal research. In discussing legal history, a line has often been drawn between internal and external history, with the former focused on the “the study of legal doctrines and institutions isolated from social context”, and the latter taking into account how the socio-political, cultural and economic milieu have impacted the evolution of law.³² The point is worth making that while the historical approach is not very popular in climate change law discourse, perhaps because of its relatively recent emergence, existing historical works are largely internal.³³ It is safe to assert that this research is premised on the latter classification than the former. Thus, it seeks to show the contingent nature of the international EST transfer structure and refutes the assumption that the same is neutral, ahistorical or can be sequestered in a vacuum.³⁴ ‘History’ in this work has not been conducted for ‘history’s sake’.³⁵ Rather,

³¹ A. Dan Tarlock, “Is There a There There in Environmental Law” (2004) 19 J Land Use & Envl L 213 at 217.

³² R. Blake Brown, “A Taxonomy of Methodological Approaches in Recent Canadian History”, (2004) 34:1 *Acadiensis* 145.

³³ See for examples, Jane Bulmer, Meinhard Doelle & Daniel Klein, “Negotiating History of the Paris Agreement” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 50 – 73; and Lavanya Rajamani & Emmanuel Guerin, “Central Concepts in the Paris Agreement and How they Evolved” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 74 – 90.

³⁴ Jim Phillips identified ‘the contingency of the law’, relative autonomy of law, its liberating potential and the alternative vision it provides as the reasons legal history matters. On the law’s contingency, he noted that law “is formed by, and exists within, human societies, and its forms and principles, and changes to them, are rationally connected to those particular societies”. Jim Phillips, “Why Legal History Matters” (2010) 41 Victoria University Wellington Law Review 293 at 295.

³⁵ Valentina Vadi distinguished between two cultures of international legal history – historians’ history and jurists’ history. While the first considers the past for its own sake, the second puts legal history in context. She concluded the piece by arguing for a crosscutting blend whereat the “boundaries between international law and history, as well as those between past and present” are broken down. This, she argued “does not aim to explain ‘history for the sake of history’; rather, it

it is intended that in reviewing the past, the present can be put in context, recycled errors can be identified and, perhaps, corrected.³⁶

The comparative approach has also been engaged in this work. This again bears direct correlation with the questions sought to be answered here, particularly the ‘impact analysis’ component of this research in chapter three. Worthy of note, however, is the distinction between the comparative approach engaged here and the conventional comparative legal approach. This traditional frame was described elsewhere as providing “insight into another country’s law, our own law ... perceptions and intuitions – a self-reflection that can often yield insight into our view of the law”.³⁷ Rather than comparing laws, this research considers the performance of a global (legal) structure in select national contexts. Hence, comparative methodology is used not as an instrument of improvement, but a tool of discovery.³⁸ Although framing this comparative endeavour in the ‘discovery context’ shields this work from the traditional complexities of conventional comparative research (e.g. the need for an understanding of the local language of a comparator³⁹), it opens other challenges. One of such is the difficulty of disconnecting an international framework from the local context within which it operates. For example, the Clean Development Mechanism’s impact in aiding technology transfer to an African State cannot be disconnected from the local dynamics of the State where a project is implemented. One way around the challenge just noted is to employ a comparative case study method. This method is said to be particularly useful when research questions border on the effectiveness of policies and the context influencing the performance of initiatives.⁴⁰

aims at “understand[ing] law as history/history as law””. See Valentina Vadi, “International Law and Its Histories: Methodological Risks and Opportunities” online: <http://eprints.lancs.ac.uk/84947/1/Histories_Harvard_Vadi.pdf> 2, 34.

³⁶ While noting that history does not provide “correct” contemporary answers, Jim Phillips noted that it may “admonish us against repeating the mistakes of the past...” *Supra* note 34 at 306.

³⁷ See Edward Eberle, “The Method and Role of Comparative Law” (2009) 8:3 Washington University Global Studies Law Review 451 at 455 – 456.

³⁸ Patrick Elgan noted that comparative law can be used as: an instrument of learning and knowledge; instrument of evolutionary and taxonomic science; improvement of domestic legal system and harmonization of law. See Elgar Encyclopedia of Comparative Law (Glenn 2006) cited in Mark Van Hoecke, “Methodology of Comparative Legal Research” (2015) Law and Method 2.

³⁹ *Ibid* at 4.

⁴⁰ Delwyn Goodrick, “Comparative Case Studies” (2014) 9 Methodological Briefs: Impact Evaluation, UNICEF Office of Research 1.

Further worth commenting on is the doctrinal nature of this research. The doctrinal approach is said to be foundational to any legal research.⁴¹ Although this is not a purely doctrinal research, an extensive review of MEAs, particularly the 1992 UNFCCC, the Kyoto Protocol, the Paris Agreement, COP Decisions and debates leading to these instruments are crucial to this work. However, the review is more focused on how the EST related provisions in the MEAs evolved through the years (1992 - 2017), and how they were implemented, than on a substantive analysis of the provisions themselves. One of the limitations of this work is the unavailability of data on transferred ESTs in general, and particularly, transfer to Africa. Reliance will, therefore, largely be placed on empirical studies in literature, particularly commissioned studies by the UNFCCC and the UNEP.

1.4 Environmentally Sound Technology Transfer in International Climate Change Law: A Literature Review

The broadness of the subject of EST transfer and the sheer volume of literature on it, make a comprehensive review almost impossible. An attempt is, however, made to appraise scholarly works by themes central to the research questions posed above. To facilitate this, select literature relatively representative of these themes, is critiqued in two sub-sections. While the first sub-section reviews scholarly works on the meaning of ESTs and technology transfer, the second sub-section appraises existing works on EST transfer both from the economic and normative perspectives.

1.4.1 Conceptual Analysis: Environmentally Sound Technologies and Technology Transfer

As extensive as are the implications of climate change, so are the ESTs necessary to respond to them. This means that ESTs do not refer to a single class of technologies. Rather, the term is a loose one used to describe a collection of technologies with differences not just in their external make-up but their complexity for use and the different conditions which must exist for them to operate. This complexity is reflected in the various definitions which have been proffered for ESTs.⁴² For example, the term has been defined as:

...technologies that have the potential for significantly improved environmental performance relative to other technologies ... total systems that include know-how, procedures, goods and

⁴¹ Fisher et al, supra note 24 at 231 – 232.

⁴² As noted by the United Nations Environment Programme (UNEP), “defining environmentally sound technologies in an absolute sense is difficult since the environmental performance of a technology depends upon its impacts on specific human populations and ecosystems, and the availability of supporting infrastructure and human resources for the management, monitoring and maintenance of the technology. See UNEP, “Environmentally Sound Technologies for Sustainable Development” (21 May 2003) online: <http://www.unep.or.jp/ietc/techTran/focus/SustDev_EST_background.pdf> at 16

services, and equipment, as well as organisational and managerial procedures for promoting environmental sustainability.⁴³

Drawing from Agenda 21's description of ESTs,⁴⁴ UNEP's 2003 study suggested that ESTs should protect the environment, pollute less, use resources sustainably, recycle wastes and products and handle residual wastes more acceptably than technologies being substituted.⁴⁵ While the above definition is no doubt wide-ranging, it does not recognize the two broad classifications of ESTs. Its emphasis on 'improved environmental performance' and promotion of environmental sustainability shows a focus on mitigation ESTs, while adaptation technologies are not covered. The comparative dimension of the above definition is also worth noting. The definition makes it clear that it "covers the full spectrum of production and consumption technologies that are more environmentally sound than the technologies for which they are substitutes".⁴⁶ No doubt, this definition does not only blur the boundary, but admits of unsustainable technologies eligible only because they pollute less than another technology.⁴⁷

Rather than explicitly defining 'ESTs', studies have generally simply identified the various categories of ESTs. An example of such work is a 2008 study which stated that "technologies to address climate change can be grouped into the two major areas for which these technologies can be utilized – mitigation and adaptation".⁴⁸ The study proceeded to define mitigation ESTs as technologies "required to reduce GHG emissions and to enhance sinks aimed at reducing the extent of global warming".⁴⁹ Although the study failed to expressly define adaptation ESTs, it generally classified adaptation ESTs into hardware and software.⁵⁰ It noted that these adaptation ESTs can be implemented in five areas – "regional and local climate modelling and early warning, coastal zone management,

⁴³ *Ibid.*

⁴⁴ Agenda 21: Programme of Action for Sustainable Development; The Final Text of Agreements Negotiated By Governments At the United Nations Conference On Environment and Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil. (New York, NY: United Nations Dept. of Public Information, 1993) Chap. 34. (Agenda 21)

⁴⁵ *Supra* note 42

⁴⁶ *Ibid* at 17.

⁴⁷ It is arguable that technologies, one way or the other pollute the environment, however how 'sustainable' they are. While this is a valid claim, the point made is that having a completely open-ended definition, with no qualifier or limitation, potentially opens ESTs up to technologies which are substantially deleterious to the environment.

⁴⁸ United Nations Department of Economic and Social Affairs (UNDESA), "Climate Change: Technology Development and Technology Transfer" Prepared for the Beijing High-Level Conference on Climate Change: Technology Development and Technology Transfer Beijing, China, 7 – 8 November 2008, online: < https://sustainabledevelopment.un.org/content/documents/1465back_paper.pdf> at 11. (UNDESA Report)

⁴⁹ *Ibid.*

⁵⁰ *Ibid* at 16.

water resources, agriculture and public health”.⁵¹ Adaptation ESTs are also classified according to actions they are used for, whether anticipatory (e.g. sensors) and/or reactive (e.g. water desalination technologies).⁵²

Apart from broadly classifying ESTs along the lines of mitigation and adaptation, other classifications have been employed. Nygaard & Hansen generally categorised ESTs into hardware, software and orgware.⁵³ While hardware refers to tangible technologies, software and orgware relate to “processes associated with the production and use of the hardware” and “the institutional framework, or organisation involved in the adoption and diffusion process of a technology”.⁵⁴ The relevance of this classification will be shown further in this work, particularly as regards conclusions reached in various studies on the transfer of technologies to Africa. Nygaard & Hansen also categorised ESTs as market and non-market goods.⁵⁵ Market goods include consumer goods (with mass market and wide supply chain) and capital goods (restricted to markets with few buyers (industry and utilities)).⁵⁶ Non-market goods, however, entail publicly provided goods (“procured and diffused by public entities”) and other non-market goods (primarily software and orgware).⁵⁷ The relevance of this classification is its assistance to appreciate various dimensions of the barriers to technology transfer, some of which will be considered shortly.⁵⁸

Elsewhere, ESTs have been classified according to their level of development: existing technologies (near term); state of the art technologies (medium term) and technologies under development (long term).⁵⁹ While near term technologies are expected to have achieved significant global adoption by 2030, medium term and long term ESTs are projected to be ripe for adoption by 2030 – 2050 and

⁵¹ Technologies under these areas include climate proofing infrastructure, tidal barriers, drainage technologies, desalination techniques, advanced recycling, advanced erosion control techniques, drought resistant crops. *Ibid* at 17.

⁵² *Ibid*. See also UNFCCC, “Technologies for Adaptation to Climate Change” (Bonn: UNFCCC, 2006) 8.

⁵³ Ivan Nygaard & Ulrich Elmer Hansen, “Overcoming Barriers to the Transfer and Diffusion of Climate Technologies”, 2nd edn (Copenhagen: UNEP DTU Partnership, 2015) 5.

⁵⁴ *Ibid*.

⁵⁵ *Ibid* at 7.

⁵⁶ Solar home systems, energy-efficient air conditioners, drought resistant crops are examples of consumer goods, while capital goods include biomass plants, small hydropower plants, etc. *Ibid* at 7, 8.

⁵⁷ Examples of publicly provided goods include sea dykes, resilient roads, mass transport systems, while other non-market goods include early warning systems for drought, etc. *Ibid* at 7, 8.

⁵⁸ *Ibid*.

⁵⁹ UNDESA, *supra* note 48 at 11.

2050 – 2100 respectively.⁶⁰ Again, this classification helps to spotlight another flaw in existing studies on the transfer of ESTs to developing countries. For example, in concluding that market factors like patent and cost are not barriers to EST transfer, studies often focus on near term ESTs, like solar PVs and wind turbines.⁶¹ When a less tunnel-like analysis is done in the context of medium and long-term technologies, the potential grave effect of the *status quo* on developing States becomes more evident. It is interesting to note that the ESTs with the highest mitigation potential are all primarily characterised by cost barriers.⁶² However, ‘ownership’, as a classificatory factor for ESTs appear to be missing from existing literature. Cognizing ‘ownership’ gives rise to another categorization of ESTs into publicly-owned, privately-owned ESTs and co-owned ESTs. While the first refers to ESTs wholly funded and controlled by governments, the second includes ESTs funded and owned by non-governmental corporate entities, and the third pertains to ESTs jointly funded and controlled by both public and private entities. This classification is key to arguments that will be canvassed elsewhere in this work.

John Barton’s work on EST access to developing States gives a high-level analysis of the global PV, biomass and wind energy industry.⁶³ While these sectors are by no means representative of the diverse mitigation and adaptation ESTs, they bring to the surface some of the intricacies and trends of the global EST market. Of relevance to this work is the study’s finding on the source of funding for EST research and development (R & D). Citing the United States and European Union as examples, two jurisdictions with the highest number of EST innovations, the study notes EST R&D are largely financed by governments in developed countries.⁶⁴ In the European Union, for example, over 50% of the investment in EST R&D were publicly funded.⁶⁵ As will be elaborated later, this finding throws a

⁶⁰ Under mitigation class ESTs, solar PVs, hybrid vehicles, wind turbines, biodiesel are examples of near-term ESTs; Hydrogen production from coal, low cost H₂ storage, water photolysis exemplify medium term ESTs; while the long-term category includes fusion power plants, genetically engineered biomass, safe long-term marine storage. *Ibid* at 12 – 13.

⁶¹ An example of how differentiating between near, medium and long-term ESTs can impact findings on how economic structures affect EST transfer is shown in John Barton’s 2007 research where while finding that patent generally does not constrict developing countries’ access to technology, noted severally that “patent issues are likely to arise primarily with the newer technologies”. See John Barton, “Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies” (2007) 1 ICTSD Programme on Trade and Environment Issue Paper, 13.

⁶² Relative to 2050, the UNDESA report projects carbon capture and storage (CCS) and (low and zero emission) vehicles as technologies with the highest mitigation capacity, at 5.5 Gigatons (Gt) of CO₂ and 5.4Gt respectively.

⁶³ Barton, *supra* note 61 at 1.

⁶⁴ *Ibid* at 7.

⁶⁵ *Ibid*.

shade on long-standing developed States' argument as to their inability to facilitate EST transfer because of their ownership by private entities. Analysing the solar PV industry, Barton notes the decentralised industrial structure detailing the location of the leading firms in Europe, Japan, United States, China and India, and their shipments.⁶⁶ As at 2005, however, five firms – Sharp, Kyocera, Shell Solar, BP Solar and Schott Solar control about 60% of the global market.⁶⁷ Even more concentration was noted in the (solar) inverter industry, where three leading companies that hold about 73% of the market are based in the United States.⁶⁸ The study noted the increasing involvement of China and India in the solar PV global industry, primarily through joint ventures with or by out-right purchase of existing firms.⁶⁹ Unlike the seemingly decentralized structure of the solar industry, Barton referenced the wind industry as more concentrated with four firms controlling three-quarters of the global market.⁷⁰ Also noticeable is the increasing break-in of China and India into this industry. China and India's increasing dominance in the global EST industry brings another dimension to this research. This is more so as both countries have in the past led the clamour for the removal of market barriers to EST access. Their fidelity to this advocacy will be considered in a latter part of this research.

Like ESTs, the concept of 'technology transfer' (TT) is not easily definable. Shabalala, in a recent work, reviewed diverse definitions of technology transfer in an EST context.⁷¹ He referenced paragraph 1.2 of the 1985 draft International Code of Conduct for Technology Transfer (ICCTT), where TT was defined as "the transfer of systematic knowledge for the manufacture of a product, for the application of a process or for the rendering of a service and does not extend to the transactions involving the mere sale or mere lease of goods".⁷² Shabalala described this definition as "perhaps the clearest definition". He further referred to chapter 34 of Agenda 21 as "the best articulated technology

⁶⁶ *Ibid* at 10.

⁶⁷ *Ibid*.

⁶⁸ *Ibid* at 11.

⁶⁹ *Ibid*. China however in the past 10 years grown to become the world's largest solar PV manufacturing country. Chinese companies, in 2017, accounted for about 60% of global solar cell production. 7 of the top 10 solar panel manufacturers are located in China, with the United States, South Korea and Taiwan making up for the remaining slots. See Tim Buckley et al, China 2017 Review: World's Second-Biggest Economy Continues to Drive Global Trends in Energy Investment, (January 2018) online: <<http://ieefa.org/wp-content/uploads/2018/01/China-Review-2017.pdf>> at 13 – 14.

⁷⁰ *Ibid* at 17. The top wind turbine companies are still unchanged 10 years after Barton's report, with Vestas (Denmark), General Electric (United States), Xinjiang Goldwind (China), Gamesa (Spain), Enercon (Germany) and Siemens (Germany) still ranked as the topmost companies. See Energy Business Review, "Top Wind Turbine Companies" (7 July 2017) online: <<http://wind.energy-business-review.com/news/top-wind-turbine-companies-5864985>>

⁷¹ *Supra* note 7 at 177 – 180.

⁷² *Ibid* at 177.

transfer definition in a MEA”.⁷³ These two value-appraisals by Shabalala are highly contestable. One, while the ICCTT definition is extensive, it seems to focus mainly on the transfer of ‘software’, leaving out the transfer of hardware and orgware. Two, Chapter 34 of Agenda 21 does not contain any explicit definition of TT. At best, it contains an agenda which should inform the transfer of publicly and privately-owned ESTs. The third definition referenced by Shabalala is contained in IPCC’s 2000 report, where TT was defined as:

A broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, NGOs and research/education institutions ... (it) encompasses diffusion of technologies and technology cooperation across and within countries ... It comprises the process of learning to understand, utilise and replicate the technology, including the capacity to choose it and adapt it to local conditions and integrate it with indigenous technologies.⁷⁴

Apart from providing one of the most comprehensive TT definitions, the 2000 IPCC report is also one of the most insightful studies on EST transfer to date. The above definition is adopted as the working definition for TT in this work.

Importantly, the IPCC study provided a sketch guideline on how to appraise effective technology transfer. It categorised the assessment criteria into: GHG and environmentally related; economic and socially related; administrative, institutional and politically related, and process-related.⁷⁵ These criteria and some of the components listed above will be developed into a grading rubric for the appraisal of UNFCCC’s policy and institutional framework in a later chapter.

1.4.2 A Review of Research Trends: Market-based and Normative Studies⁷⁶

Existing works on EST transfer can be broadly classified as patent oriented and non-patent related research, with the former having the larger percentage of scholarly attention. Researchers’ focus on IPRs/patent viz-a-viz technology transfer is not unjustified, as the subject remains one of the most drawn-out issues in global climate change discourse. Literature reviewed here has, however, been

⁷³ *Ibid.*

⁷⁴ IPCC, *Methodological and Technological Issues in Technology Transfer* (Cambridge: Cambridge University Press, 2000) 15 – 16. Nygaard & Hansen provides an abridged version of this definition thus: “the transfer and diffusion of climate technologies ... (is) the exchange of the technical artefacts (hardware), knowledge (software) and organisational elements (orgware) both across and within countries”. *Supra* note 53 at 11. See also Shabalala, *supra* note 7 at 178 – 179.

⁷⁵ *Ibid* at 17.

⁷⁶ This segment is, in part, adapted from a literature review conducted as part of a (thesis) research prospectus assignment submitted for the Schulich School of Law LLM Graduate Seminar class.

classified as market-based and normative. The market-based classification recognises other pockets of EST transfer studies which are disconnected from the patent argument but are predicated on market performance. Studies under the normative category entail a growing body of literature that seek to demphasise the distracting prominence of market considerations in EST transfer discourse. Leading the pack in this regard is a 2011 study commissioned by the International Council on Human Rights Policy (ICHRP), which drew on six earlier commissioned papers by John Barton, Simon Caney, Marcos Orellana, et al.⁷⁷ Under the market-based category, this review focuses on claims and counter-claims on the issues of: the facilitative or inhibitive role of IPRs/patent to EST transfer to developing countries; the absorptive capacity of host States as the primary limiting factor of EST transfer; and the involvement of non-State parties in EST transfer.

Over and beyond any other issue, the IPRs/patent debate represents the most gaping divide between developed and developing States under the climate change framework. In summary, the case of developing countries is that IPRs and patents are constraints to effective transfer.⁷⁸ On the flipside, developed countries have argued that IPRs are enablers and that constraining them will disincentivize innovation. The point has, however, been made that the arguments on both sides lack empirical support to connect the state of EST diffusion in developing countries to intellectual property rights.⁷⁹ It is in this regard that a flurry of empirical studies was conducted between 2007 and 2013 on IPR's role in EST transfer. Pioneering this research area was Stanford Law School's John Barton's work on IPR and the transfer of solar, biofuel and wind technologies to developing countries.⁸⁰ Focusing on advanced developing countries (China, India and Brazil), the report concluded that "with respect to access to the benefits of the technology ... there seem unlikely to be significant IP barriers to

⁷⁷ ICHRP, *supra* note 6 at vii.

⁷⁸ See for examples – Proposals by India for Inclusion of Additional Agenda Items in the Provisional Agenda of the 17th Session of the Conference of Parties, 21 September 2011, FCCC/CP/2011.INF 2 and Contribution of Intellectual Property to Facilitating the Transfer of Environmentally Rational Technology – Communication from Ecuador', (2013) WTO IP/C/W/585, pp. 1 – 5. It is striking to note that despite the insistence of developing countries on this subject, 'intellectual property rights' is not mentioned in any of the extant MEAs. This is due to developed States' insistence that the UNFCCC is not the appropriate place to iron out the issue, as same falls under the purview of the World Trade Organization (WTO).

⁷⁹ See United Nations Environment Programme, "Patents and Clean Energy: Bridging the Gap Between Evidence and Policy – Final Report" (UNEP, 2010) 13.

⁸⁰ Barton, *supra* note 61.

developing nation access”.⁸¹ This report and similar studies thereafter⁸² are, however, limited by their focus on BASIC States and narrowly scoped conception of technology transfer.⁸³

Researchers are in no way *ad idem* on the position that IPR is not a barrier to the transfer of ESTs. Cameron Hutchinson, for example, concludes that “strong patent protection rights increase the cost of technological acquisition while having no positive bearing on increased foreign direct investment in, or technology trade to, many developing countries”, and that “TRIPS forecloses an effective remedy of international compulsory licensing in cases where developed country “patent holders refuse to license technologies to developing country firms”.⁸⁴ Hutchinson’s research can be critiqued for not being anchored on empirical proof for the conclusions he reached. Nevertheless, as confirmed by a 2013 UNEP study, empirical studies carried out over the years have arrived at different findings, “some contradictory”.⁸⁵ Despite these disparate findings, the said UNEP report concluded that with less than 1% of all applications for mitigation and adaptation worldwide filed in Africa, “patent rights are unlikely to be a major consideration in any decision to exploit CETs in Africa”.⁸⁶ It added that “the main factors impeding technology transfer are access to real know-how from the source companies (including access to trade secrets), access to suitably skilled staff, scientific infrastructure and favourable conditions”.⁸⁷ Rather than support the claim that IPRs do not constrict EST transfer, the UNEP report appears to do otherwise. As shown earlier, accessing software and orgware are central to EST transfer; it transcends the transfer of hardware. Typical of previous studies, the UNEP report also focused on a survey of patent filings to reach its conclusions. Shabalala, in his critique of this kind of quantitative research, noted:

To date several quantitative analyses have been attempted, but many suffer from serious methodological flaws in that they equate equipment flows with technology transfer and do not

⁸¹ *Ibid* at 18.

⁸² See generally David Ockwell et al, “Intellectual Property Rights and Low Carbon Technology Transfer: Conflicting Discourses of Diffusion and Development” (2010) 20 *Global Environmental Change* 729 and Ian Harvey, “Intellectual Property Rights: The Catalyst to Deliver Low Carbon Technologies” (2008) *Breaking the Climate Deadlock Briefing Paper*.

⁸³ Meir Perez Pugatch, *Intellectual Property & the Transfer of Environmentally Sound Technologies*, (Global Challenges Report, WIPO: Geneva, 2011) 14, 15.

⁸⁴ Cameron Hutchinson, “Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?” (2006) 3 *University of Ottawa Law & Technology Journal*, 1.

⁸⁵ UNEP, *Patents and Clean Energy Technologies in Africa* (UNEP, 2013) 18.

⁸⁶ *Ibid* at 61.

⁸⁷ *Ibid* at 60.

measure flows of know-how, information and licensing levels that occur. In addition, the analyses measure the technology transfer claims rather than project evaluations and outcomes.⁸⁸

Rather than taking either side of the patent debate, other studies on this subject have been more nuanced, identifying the strengths and weaknesses of both sides and suggesting ways in which the concerns of parties can be integrated into an effective EST transfer framework.⁸⁹ Keith Maskus & Ruth Okediji's work in this respect deserves mention.⁹⁰ In developing what they described as "a third, more nuanced approach" to EST transfer,⁹¹ Maskus & Okediji classified ESTs as public goods.⁹² This approach proposes "tailored and discrete government measures, combined with IPRs, to provide a meaningful array of incentives to develop and disseminate ESTs."⁹³ While cautioning against generalized IPR reforms, they recommend alternative EST R&D investment models to offset private firms' R&D costs and alternative incentive models to address challenges like "differentiated adaptation costs" in developing countries and sustainable long-term investments.⁹⁴ These initiatives will be funded through an expanded *Global Environment Facility* under the World Bank, grants from developed countries or through the establishment of a Global Emissions Reduction Fund (GERF).⁹⁵

Focusing more on the role of African countries in the global EST transfer construct, Damilola Olawuyi in a recent work, contends that "the key barrier to climate technology diffusion across Africa is arguably not the lack of technology inflow to Africa; rather, it is the perennial inability of African States to absorb and assimilate transferred technology."⁹⁶ In attempting to justify this position, he conducted a comparative review and survey of select African countries and identified inadequate information, weak legal protection, lack of technical and institutional capacity, weak investment

⁸⁸ Shabalala, *supra* note 7 at 181 – 182.

⁸⁹ See for example Ahmed Abdel Latif et al, *supra* note 17, and Ahmed Abdel-Latif (2015) Intellectual property rights and the transfer of climate change technologies: issues, challenges, and way forward, *Climate Policy*, 15:1, 103-126, DOI: 10.1080/14693062.2014.951919.

⁹⁰ Keith Maskus & Ruth Okediji, "Intellectual Property Rights and International Technology Transfer to Address Climate Change" (2010) ICTSD Issue Paper No. 32.

⁹¹ *Ibid* at v.

⁹² *Ibid* at 38. Elsewhere, Global Public Goods (public goods) were defined as "those goods (including policies and infrastructure) that are systematically underprovided by private market forces and for which such under-provision has important externality effects. The concept that a good is 'public' stems from a combination of nonrivalry in consumption and non-excludability in use". See Keith Maskus & Jerome Reichman, "The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods" (2004) 7(2) *Journal of International Economic Law* 279 at 282.

⁹³ *Ibid* at 2.

⁹⁴ *Ibid* at viii.

⁹⁵ *Ibid* at 25.

⁹⁶ *Supra* note 12 at 4.

environment and inadequate/lack of climate change laws as key barriers. Olawuyi's argument mirrors another common trend in global EST transfer discourse: the view that the absence of pull factors (conducive investment, legal and regulatory climate) in developing States is primarily responsible for the ineffective EST transfer regime. This has consequently led to the emphasis on technology needs assessment in developing States to identify technology needs and implementation action plans. Shalababa tracks and critiques this position thus:

...Industrialized countries have generally focused on non-regulatory and market mechanisms as the prime vector for technology transfer, and have pointed to weaknesses in developing countries that prevent market mechanisms from working ... Industrialized countries thus focus on so-called 'host country measures', rather than on their own obligations and on 'home country' measures.⁹⁷

The involvement of non-State parties is another theme on which scholarship on EST Transfer has developed in recent years. Looking beyond the IPR debate, Anna Davies focused on collaborative ventures outside mainstream market structures for the transfer of ESTs.⁹⁸ Hence, she referenced For-Profit organizations (e.g. Innovation Exchange Inc) and Not-For-Profit establishments (e.g. Potential Energy and Eurofit) which have through "open source innovation, crowdsourcing and innovation contests" facilitated the development, transfer and diffusion of ESTs.⁹⁹ Srinivas, on the other hand, argued for a move beyond the North – South technology transfer structure into a more inclusive construct entailing: South – South, South-North and North-South transfer.¹⁰⁰ This proposed structure aligns with the United Nations South-South and Triangular Cooperation programme (SSTC).¹⁰¹

As will be considered in more details in chapter five, three studies by the ICHRP, Oche Onazi and Baskut Tuncak between 2011 and 2013 are emblematic of increasing scholarly attention to a more normative approach to EST transfer. The ICHRP study, in the main, argues that rather than

⁹⁷ Shabalala, *supra* note 7 at 179.

⁹⁸ Anna Davies, "Partnership and Sharing: Beyond Mainstream Mechanisms" in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 108.

⁹⁹ *Ibid* at 112 – 123.

¹⁰⁰ Krishna Ravi Srinivas, "Climate Change, Technology Transfer and Intellectual Property Rights: A Modest Exercise in Thinking Outside the Box" in in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 167 – 176.

¹⁰¹ The SSTC has its root in United Nations Resolution 64/222 of 21 December 2009. It entails a "process whereby two or more developing countries pursue their individual and/or shared ... development objectives through exchanges of knowledge, skills, resources ... supported by a developed country(ies) or multilateral organization(s)..." See UNDP, "Frequently Asked Questions: South-South and Triangular Cooperation" (2014) online: <http://www.undp.org/content/dam/undp/library/Poverty%20Reduction/Development%20Cooperation%20and%20Finance/SSC_FAQ%20v1.pdf>

emphasising the “tired opposition between state and market”, human rights as a provider of “language on which broad agreement already exists over minimal standards for action” should be the premise on which the global EST transfer negotiation is held.¹⁰² While admitting that human rights does not have all the answers for the various disputes bedevilling EST transfer, it contends that they can “help identify the core areas of agreement: a basis for urgent, if minimal, actions in the face of climate imperatives that may help overcome the deadlock”.¹⁰³

These works provide a snapshot of the core issues in EST transfer discourse and how they have been approached. Worth noting is the dominance of empirical studies and comparative analyses of how ESTs have percolated over time. While empirical study of EST transfer trends is necessary, it is not an adequate tool by which to assess reasons for the low level of EST transfer and diffusion in Africa. Statistics on the number of patents registered and where they were registered are limited in explaining normative constructs, presumptions, historical and sociological factors which inform the present global IPR system. I am not aware of any scholarly work which has comprehensively assessed and critiqued UNFCCC technology transfer mechanisms over the years, how they evolved, and the implications of the transition for Africa.¹⁰⁴ While the reviewed research on the intersect between human rights and EST transfer are of immense relevance to this thesis, they have also left questions raised in this thesis unanswered. The gaps have led to the iteration of concepts, programmes and structures, different in nomenclature but similar in substance under the UNFCCC regime. The EST transfer structure under the UNFCCC has largely mutated through five phases over the years: The pre-UNFCCC, Pre - Expert Group on Technology Transfer (EGTT); EGTT; Poznan; and technology mechanism phases. What informed these transitions? What are the similarities and differences in these phases? How did African countries fare under each phase? To what extent can the lessons gleaned from the past phases impact a reformation of the current structure? TWAIL provides both theoretical and analytical instruments to engage these questions. To this theory I now turn.

¹⁰² ICHRP, *supra* note 6 at 3 – 4.

¹⁰³ *Ibid* at 4.

¹⁰⁴ There are however works which consider specific UNFCCC EST transfer mechanism under particular frameworks. See for examples Gary Cox, “The Clean Development Mechanism as a Vehicle for Technology Transfer and Sustainable Development – Myth or Reality” (2010) 6 Law, Environment and Development Journal 179 and Coninck and Sagar *supra* note 17 at 258.

1.5 Third World Approaches to International Law (TWAIL), International Climate Change Law and Technology Transfer

A comprehensive analysis of what TWAIL means and what its implications are, are outside the scope of this work. What is intended, however, is to succinctly review what TWAIL means as a theoretical framework and methodology, its presumptions and weaknesses. It will be highlighted that while TWAIL, as originally construed, might fall short as an analytical instrument for this work, retrofitting it as a normative theory makes it a relevant tool to track the evolution of the global EST regime, unmask its assumptions and evolve an effective and equitable reform agenda. Further, as will be shown, a retrofitted TWAIL helps understand the emergence of developed-developing States (BASIC States) impact on the North-South EST transfer discourse and the roles these States can play in moving the discussion forward.

1.5.1 What is TWAIL?

Different from conventional theoretical frameworks, TWAIL has no defined or generally accepted methodology, approach or argument.¹⁰⁵ It is noted elsewhere that as against being a “monolithic collegium”,¹⁰⁶ TWAIL is more like “a chorus of voices that blend though not always harmoniously, in attempting to make heard a common set of concerns”.¹⁰⁷ These ‘common set of concerns’ form the core of TWAIL as a theoretical tradition and the band, however how elastic, that links its proponents. While not exhaustive, the following represent the commonalities that characterize TWAIL scholarship,¹⁰⁸ particularly in the international environmental/climate change law context:

¹⁰⁵ Anghie & Chimni noted that “TWAIL is not a method, if by method we simply refer to a means of determining “what the law is.” But it is certainly as much a “method” as feminism ... these are not methods in the traditional sense, but they are distinctive ways of thinking about what international law is and should be; they involve the formulation of a particular set of concerns and the analytic tools with which to explore them” Antony Anghie & B.S. Chimni, “Third World Approaches to International Law and Individual Responsibility in Internal Conflicts” (2003) *Chinese Journal of International Law* 77

¹⁰⁶ Obiora Okafor, “Newness, Imperialism, and International Legal Reform in Our Time: A TWAIL Perspective” (2005) 43:1/2 171 at 176.

¹⁰⁷ Karin Mickelson, “Taking Stock of TWAIL Histories” (2008) 10 *International Community Law Review* 355 at 360. Eslava & Pahuja also noted that “although there is arguably no single theoretical approach which unites TWAIL scholars, they share both a sensibility, and a political orientation. TWAIL is therefore not so much a method, as a political grouping or strategic engagement with international law, defined by a commonality of concerns”. See Luis Eslava & Sundhaya Pahuja, “Between Resistance and Reform: TWAIL and the Universality of International Law” (2011) 3:1 *Trade, Law & Dev* 103 at 104.

¹⁰⁸ ‘TWAIL Scholarship’ has been employed here as referring to an intellectual work which meets the qualities laid out by Makau Mutua: (i) Fundamentally oppositional to an important international law question; (ii) Disagreement must relate to an issue of significance to the third world; (iii) Purpose of scholarship must be to eliminate or alleviate the harm suffered by the 3rd world as a result of an unjust international legal, political and economic order; (iv) Concerned with justice or the fairness of norms, institutions and processes and practice in the transnational arena; (v) Its overriding purpose must be the elimination of the third world’s powerlessness; (vi) It should expose, attack or unpack a particular inimical

- i. History is TWAIL’s most fundamental approach;¹⁰⁹ the history of international law scholarship which “participated in, and legitimated global processes of marginalization and domination”.¹¹⁰ An approach “marked by an insistence on ...continuity; the links of processes of colonial expansion and domination”.¹¹¹
- ii. TWAIL seeks to deconstruct the “history, structure and process of international law” from a third world perspective and “gives meaning to international law in the context of the lived experiences of the ordinary peoples of the third world in order to transform it into an international law of emancipation”.¹¹²
- iii. International (Environmental) Law is Eurocentric, not global; the imposition of the powerful minority (North) on the immiserated majority (South).¹¹³ Particularly, international environmental law reflects a western eco-imperialistic agenda.¹¹⁴

Evident from the foregoing is TWAIL’s recourse to the past to unmask a pro-North international system and its effort at the re-creation of a just, fair and equitable system.¹¹⁵ Hence, TWAIL has been described as a blend of resistance and reformation.¹¹⁶ Indeed, Makau Mutua described TWAIL as both “reactive in the sense that it responds to international law as an imperial project ... but it is proactive because it seeks the internal transformation of conditions in the Third World”.¹¹⁷ One will be remiss in conceptualising TWAIL without referencing its evolution from what has been tagged TWAIL I to TWAIL II, as this has crucial implications for this research.¹¹⁸ While TWAIL I and II are both anti-hegemonic and crusade a third world equity agenda, there are some marked differences.¹¹⁹ Some of

phenomenon to the third world. See Makau Mutua, “What is TWAIL?” (2000) 94 *American Society of International Law Proceedings* 31 at 36.

¹⁰⁹ Karin Mickelson, “Rhetoric and Rage: Third World Voices in International Legal Discourse” (1998) 16:2 *Wisconsin International Law Journal* 353 at 406.

¹¹⁰ 1997 TWAIL Vision Statement, reproduced by Mickelson, *supra* note 107 at 357 – 358. TWAIL-ers generally see International Law as an illegitimate regime; “...a predatory system that legitimizes, reproduces and sustains the plunder and subordination of the Third World by the West...” See Mutua, *supra* note 108 at 31.

¹¹¹ Mickelson, *supra* note 109 at 387.

¹¹² B.S. Chimni, “The Past, Present and Future of International Law: A Critical Third World Approach” (2007) 8 *Melbourne Journal of International Law* 499 at 499 – 500.

¹¹³ The phrases “powerful minority” and “immiserated majority” were used by Keba M’Baye, and reproduced by Karin Mickelson, *supra* note 109 at 402.

¹¹⁴ See Mickelson, *Ibid* at 386 – 388.

¹¹⁵ Eslava & Pahuja argue that TWAIL’s most significant point of departure from mainstream interpretation of international law is its insistence that material distribution and imbalances of power impact on the production and understanding of international legal concepts and norms. Further, TWAIL has made a “substantive contribution to the revitalization of questions about justice in the international legal order”. *Supra* note 107 at 105.

¹¹⁶ *Ibid*.

¹¹⁷ Mutua, *supra* note 108 at 31.

¹¹⁸ Anghie & Chimni, *supra* note 105 at 79.

the differences include: TWAIL II's focus on third world people as against third world States, its emphasis on the centrality of colonialism and "the politics of knowledge" – domination of northern scholarship and narrative.¹²⁰

1.5.2 Reframing the TWAIL Narrative

TWAIL's transition from 'I' to 'II' was compelled by the need for continued relevance.¹²¹ This is more so as many contended that with the end of the Cold War, the distinction between the 'first world' and 'third world' was obviated.¹²² This transition has, however, not purged TWAIL of its constricting features, which have, arguably, made it more of an antagonistic tool than a reformatory implement. Relevant to this work are two of such features, broadly described as definitional and normative.

What does 'third world' mean or how can the 'global south' be defined? The concept of a 'third world' has, overtime, eluded clear definition. In attempting to capture the varying definitions, Rajagopal considered the term under four classificatory groups – the ideological; geopolitical; historical deterministic and popular representation models.¹²³ While the first model is framed around the alignment and non-alignment movement, the second model is construed "in terms of political and economic organization". The third is defined in terms of "countries which had suffered the experience

¹¹⁹ While TWAIL I is described as "a retrospective name given to the first generation or so of international lawyers who were institutionally close to the struggle for freedom from colonisation", TWAIL II describes a more revolutionary genre of TWAIL birthed by the frustration of TWAIL I proponents to the failings of their reformist agenda to international law. See Eslava & Pahuja, *supra* note 107 at 115, 117. According to Rajagopal, the TWAIL I to II transition entailed a "shift from looking at international law's absence as the source of all problems, to looking at ... (its) presence as an often unwitting and sometimes conscious instrument of injustice". See Balakrishnan Rajagopal, "International Law and Its Discontents: Rethinking the Global South" (2012) 106 *American Society of International Law Proceedings* 176 at 176 - 177.

¹²⁰ Anghie & Chimni, *supra* note 105 at 82 – 87. Anghie's 2004 publication exemplifies the TWAIL II genre. In this work, he argued, *inter alia* that "colonialism was central to the constitution of international law ... that in the field of international law, the civilizing mission was animated by ... the question of 'cultural difference'"; that the 'dynamic of difference' entails the "endless state of creating a gap between two cultures, demarcating one as 'universal' and civilized and the other as 'particular' and uncivilized, and seeking to bridge the gap by developing techniques to normalize the aberrant society". He argued that, "this dynamic animated the development of many of the central doctrines of international law – most particularly, sovereignty doctrine" and that the "is self sustaining ... each act of bridging further differences that international law must seek to overcome". See Antony Anghie, *Imperialism, Sovereignty and the Making of International Law* (Cambridge: Cambridge University Press, 2005) 3 – 8.

¹²¹ Rajagopal noted that "TWAIL II was both a response to the limits and promise of TWAIL I as well as a response to the change in global, historical and structural conditions of changing economic, political and cultural power, and the transformation of the role of the main participants in the system ..." see *Supra* note 119 at 177.

¹²² R.B.J. Walker, "Space/Time/Sovereignty", in M.E. Denham and M.O. Lombardi (Eds.), *Perspectives on Third World Sovereignty: The Postmodern Paradox* (1996) 13 at 15 cited in B.S. Chimni, "Third World Approaches to International Law: A Manifesto" (2006) 8:3 *International Community Law Review* 3 at 4 – 5.

¹²³ Balakrishnan Rajagopal, "Locating the Third World in Cultural Geography" (1999) 15:2 *Third World Legal Studies* 1 at 1 – 2.

of colonialism and imperialism”, and the fourth is representative of “poverty, squalor, corruption, violence, calamities ... or simple lack of modernity”.¹²⁴ According to Rajagopal, a common thread that runs through the first three models is the colonial experience of nations.¹²⁵

As earlier noted, TWAIL II heralded a shift from a State based definition of the ‘third world’ to a people-based definition. However, I argue that despite this supposed transition, ‘State’ as a bounded geographical enclave still constitutes the core of mainstream TWAIL scholarship. The reference to ‘people’ in the relevant works invariably connotes ‘people’ in a specific ‘nation-state’ in Africa, Asia or Latin America. Anghie & Chimni, for example, stated that TWAIL scholars are concerned about identifying and giving “voice to the people within third world States ... who had been excluded from consideration by TWAIL I scholarship”.¹²⁶ Such a contention is evidently still locked in, and potentially inhibited by what Rajagopal has described as the “national allegory”. Again, the contention is not helpful to the quest to delineate the third world, however loosely. Are the people being referred to within a ‘third world’ that is historically, geopolitically or economically defined? This definitional challenge is particularly relevant to understanding the role of the BASIC State in the climate change discourse.¹²⁷ It is also relevant because of its ‘exclusive’ characteristic. Descriptively, if historically defined, ‘uncolonized’ Ethiopia is excluded; if geopolitically defined, then Europe’s Moldova becomes excluded; and if economically defined, the BASIC States are on the ‘verge’ of exclusion. Given these complexities, it has been asserted that the ‘third world’ is obsolete, “as there is a first world in every third world, and a third in the first...”¹²⁸

More fundamentally limiting is TWAIL’s ‘inoculative’ approach to reforming International Law. John Haskell made this critique pointedly: “...the TWAIL movement suffers from the paradox that its argumentative logic ultimately relies on the same underlying assumptions of the system it sought to transcend”.¹²⁹ Neo-liberalism and its attendant features of capitalism, consumerism and commodification are at the core of (western) international (environmental) law, and by extension, the UNFCCC EST transfer regime. However, TWAIL as popularly operationalized, runs on these same

¹²⁴ *Ibid.*

¹²⁵ *Ibid* at 2.

¹²⁶ *Supra* note 105 at 83.

¹²⁷ See Usha Natarajan, “TWAIL and the Environment: The State of Nature, the Nature of the State, and the Arab Spring” (2012) 14 *Oregon Review of International Law* 177 at 180.

¹²⁸ Michael Hardt & Antonio Negri, *EMPIRE* (2000) 263 – 264 cited by Natarajan, *Ibid.*

¹²⁹ John Haskell, “TRAIL-ing TWAIL: Arguments and Blind Spots in Third World Approaches to International Law” (2014) 27:2 *Canadian Journal of Law and Jurisprudence* 1 at 32.

concepts. Describing this normative failing, Rajagopal noted that the third world remains “mired in the Eurocentrism of (the) metanarratives of capitalism and communism/socialism” and has failed to develop an “internal alternative”.¹³⁰ More descriptively, referencing the botched attempt to establish a New International Economic Order (NIEO), it has been inferred that the ‘economic catch-up’ has become the teleological narrative of the “spatial relationship between the North and the South”.¹³¹

While not laying claim to solving TWAIL’s definitional and normative conundrums, a normative descriptive approach is adopted in this work. This approach draws from the works of Rajagopal and Mickelson. Here, ‘third world’ or ‘global south’, and by extension, TWAIL, is engaged as a counter hegemonic worldview which provides an alternative narrative to Eurocentrism and its capitalist priorities. In Mickelson’s words:

...a historically constituted, alternative and oppositional stance within the international system ... (involving) not merely a more equitable distribution of resources, or a reshuffling of existing power relations ... (capturing) ... (a) revolutionary nature of the alternative sought: a fundamental rethinking of international relations.¹³²

Rajagopal similarly argued that ‘third world’ “should be reimagined as a counter-hegemonic discursive tool that allows us to interrogate and contest the various ways in which power is used”.¹³³ This normative approach helps in the “search for alternatives in international law ... by critiquing ... foundational assumptions, which permeate the legal order that defends development and globalization”.¹³⁴ While preserving the historical methodology of TWAIL, this approach at once expands and constricts the third world boundaries. Large enough to embrace ‘non-State’ and ‘State’ entities alike, and narrow enough to exclude ‘non-State’ and ‘State’ entities with capitalistic and monetarist ideologies. It is in this sense that TWAIL breaks away from its “geographic ‘national’ moorings”¹³⁵ or even economic standing. Hence, BASIC countries are not automatically ‘Southern’ by reason of their geographical location, history or economic status.¹³⁶ The decisive question is: have BASIC States kept faith with the alternative agenda of the South or are they reproducing and

¹³⁰ Rajagopal, *supra* note 123 at 16.

¹³¹ *Ibid* at 18.

¹³² Mickelson, *supra* note 109 at 360.

¹³³ *Supra* note 123 at 19 – 20.

¹³⁴ *Supra* note 109 at 180 – 181.

¹³⁵ *Ibid*

¹³⁶ As noted by Rajagopal, “it is not automatically the case that the rise of BRICS (BASIC) would lead to progressive or regressive international law ... It is also not clear if BRICS (BASIC) countries behave significantly differently towards weaker, smaller countries, compared to powerful Northern States”. *Supra* note 119 at 179.

reinforcing the hegemonic and imperialistic agenda of the North? This approach, while still potentially qualifying entities in TWAIL's traditional domains (Africa, Asia and Latin America) as 'third world', also allows for the bolstering of third world ranks either through the inclusion of entities in the 'traditional north' or exclusion of 'backsliding' States in the 'traditional South'.

The counter-hegemonic and alternative narrative spoken of here should not be mistaken for singleness of position, but rather diverse positions unified by a non-commercialistic and non-imperialistic paradigm. An attempt at operationalizing this narrative is made in chapter five. While this thesis concludes with a nuanced re-consideration of the responsibilities of State and non-State parties, it proceeds from a traditional understanding of these responsibilities *qua* developed – developing States categorisation as enshrined in the 1992 Convention and 1997 Kyoto Protocol. In doing this, there is a recognition of emerging economies like the BRICS States, particularly China and India, and this is considered in chapter three of this work. It should further be noted that the State-centricity of this work does not detract from the importance of non-State entities, particularly business corporations, in the global EST scheme. The page and time limits of this work, however, compel a restriction of the analysis to States.¹³⁷

1.6 Structure of Thesis

Having considered the research problem, questions, methodological and theoretical framework of this research in this chapter, Chapter two applies the broad themes conceptualised here to trace how the UNFCCC EST framework has evolved and what informed the evolution. Chapter three then proceeds to consider the impact of the evolution in African countries, taking specific look at select initiatives like the Clean Development Mechanism under the Kyoto Protocol and the Poznan Strategy. This chapter also considers the involvement of BASIC States in facilitating EST transfer to developing (African) States in a South – South transfer context by comparing their present actions to their past rhetoric. Chapter four focuses on the current climate regime *viz-a-viz* its EST transfer framework, the degree to which the current regime reproduces past structures and the impact of such iteration. The work concludes in chapter five with a proposed reform agenda for the EST transfer regime.

¹³⁷ Availability and accessibility of State-based data on EST transfer, in comparison to non-State initiatives, also informs a focus on States.

CHAPTER 2: THE EVOLUTION OF THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE TECHNOLOGY TRANSFER REGIME: A TWAIL NARRATIVE

As noted in chapter one, this thesis considers the history, impact and prospects of the technology transfer regime under the international climate change framework, particularly, the UNFCCC. This chapter focuses on the evolution of the UNFCCC EST transfer regime. In the main, it contends that whereas the climate regime has witnessed multiple phases in its negotiation and development of transfer policies, similar trends characterise the various phases. The chapter begins by re-considering the ‘basis’ of south – north engagement in respect of EST transfer as represented by the ‘differentiation’ concept, appraises the different phases of the UNFCCC EST transfer regime, reviews the central points of divergence between developing and developed States, and concludes by drawing lessons from distilled historical trends.

2.1 Rights, Responsibilities and Technology Transfer in Climate Change Discourse

The borderless nature of climate change defies the artificiality of State borders and calls to task the traditional concepts of sovereignty and territoriality.¹ Subsumed in this commonness, however, are various shades of *individuality*. For instance, while the consequences of climate change are global, its causes are largely attributable to a few States.² On the converse, despite the ubiquity of climate change, States bear the brunt of its implications differently, with some of the least responsible suffering the most.³ Importantly, while this collective problem demands actions across the world, only a few States which tend to be the most responsible for climate change, have the most capacity to combat it. It is this interplay of globality and individuality that has, in part, earned climate change the descriptor of a

¹ As noted by the former United Nations Secretary General, Ban Ki Moon, “climate change does not respect national borders; developing countries or developed countries...”. See UNFCCC, ““Climate Change does not respect national borders”, UN chief Ban Ki-moon”, (29 November 2015), online: <<https://unfccc.int/news/video-climate-change-does-not-respect-national-borders-un-chief-ban-ki-moon>>

² For example, the United States and the European Union, constituting less than 12% of the world’s population are responsible for about 40% of global CO₂ emissions between 1860 and 2012, and are projected to be responsible for about 37.5% increase in global temperature in 2100. See Marcia Rocha et al, “Historical Responsibility for Climate Change – From Countries Emissions to Contribution to Temperature Increase” (November 2015) *Climate Analytics* 8, 12.

³ A recent report notes that nine of the ten countries most affected by climate change induced extreme weather events between 1996 – 2015 were developing countries. Sonke Kreft, et al, *Global Climate Risk Index 2017: Who Suffers Most From Extreme Weather Events? Weather-related Loss Events in 2015 and 1996 to 2015* (Bonn: Germanwatch e.V., 2017) 6.

“super wicked problem”.⁴ More so, it is this interplay that founds the perceptions and positions of States as to how climate change should be approached, and how roles are to be ascribed.

2.1.1 Differentiation, Climate Change and Technology Transfer

Should all States bear the same level of responsibilities in the fight against climate change? If responsibilities should differ, what are the justifications for different allocations? To what extent should responsibilities differ? Within what sphere should the different responsibilities be performed, intra-State or inter-State, and on what basis should one State bear responsibilities for actions that will be taken in another? While the first question is fairly settled, as developed States, generally, do not contend that all States should bear the same level of responsibilities, the remaining questions have blighted the climate change regime for years. These questions, although relevant to all aspects of the climate change discourse, apply even more particularly to EST development and transfer. As will be pointed out shortly, while the case of developing States for the transfer of ESTs has been framed as ‘of right’, developed States have resisted such claims, proposing transfer initiatives as ‘gratuitous offerings’.

Noting the implications of these disparate positions, Rajamani noted that while the ‘as of right’ argument is “rooted in *obligation* and *liability*”, the “gratuitous offerings” position is “rooted in *morality*, *humanity* and *goodwill*”.⁵ This argument has been framed around the concept of *differentiation* and the UNFCCC EST transfer policies and institutions have substantially been impacted by it.⁶ As the rationale, operation and implications of *differentiation*⁷ have been the subjects

⁴ In addition to being riddled with “enormous interdependencies, uncertainties, circularities and conflicting stakeholders...”, climate change has been described as a super-wicked problem due to its time-costly implications; countries in the “best position to address the problem are not only those who caused it, but also those with the least immediate incentive to act within the necessary shorter timeframe”... See Richard Lazarus, “Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future” (2009) 94 Cornell L Rev 1153 at 1159 – 1161.

⁵ See Lavanya Rajamani, *Differential Treatment in International Environmental Law* (Oxford: Oxford University Press, 2006) 86.

⁶ According to Patricia Ferreira, differentiation can be approached as “a value-driven (promoting justice among unequal States), and a pragmatic or instrumental approach (promoting broad participation)”. She further notes that “the principle of differentiation by individual states and groups of states may evolve over time, and is not permanently tied to the interpretation of the principle as originally conceived at the time of signature or ratification of the MEA”. See Patricia Ferreira, “Differentiation in International Environmental Law: Has Pragmatism Displaced Considerations of Justice?” in Neil Craik, et al, *Global Environmental Change and Innovation in International Law* (Cambridge: Cambridge University Press, 2018) 21 at 25.

of various scholarly commentaries,⁸ it will not be considered in-depth in this chapter. Instead, an attempt will be made to trace how the concept, as reflected in the common but differentiated responsibilities principle (CBDR) evolved within the climate change *qua* EST transfer regime. The often-missed distinct implications of the CBDR principle in the EST transfer context make it necessary to consider the concept via this narrow prism. It is worth asking if the arguments on differentiation are relevant to EST transfer under the current climate change regime. Put differently, what effect do the entrenched positions of developing and developed States on differentiation have on the EST transfer agenda?⁹

Developing States' stance on differentiation can be captured under two broad categories: the ecological space and the historical reparation arguments.¹⁰ The ecological space argument is centred around the historical and present emissions of industrial countries vis-à-vis the 'essential' emissions needed for developing countries to develop. Anil Agarwal and Sunita Narain described these two forms of emissions as 'luxury emissions' and 'survival emissions'.¹¹ In a more recent sequel, Narain argued that:

⁷ Also referred to as 'differential treatment', differentiation is said to refer "to instances where, because of pervasive differences or inequalities among states, the principle of sovereign equality is sidelined to accommodate extraneous factors, such as divergences in levels of economic development or unequal capacities to tackle a given problem". See Philippe Cullet, *Differential Treatment in International Environmental Law* (Milton Park, Abingdon, Oxon: Routledge, 2016) 15. Missing from this description of differentiation, is the historical perspective of developing States. To developing States, differentiation is not a sidelining of "the principle of sovereign equality", rather it is an expression of their sovereignty and equality. For example, vital to the argument of developing States is that all States have equal right to the ecological space; and given the historical emissions of developed countries, have a right to a larger portion of the global carbon budget. Hence, Rajamani's conceptualization of differentiation either in the compensatory/inherent or instrumental senses better captures what the term denotes. See *supra* note 5 at 8 – 9.

⁸ For detailed analyses of 'differentiation', see generally Rajamani, *supra* note 5; Cullet, *Ibid*; Lavanya Rajamani, "The Changing Fortunes of Differential Treatment in the Evolution of International Environmental Law" (2012) 88:3 *International Affairs* 605 – 623; and Lavanya Rajamani, "Ambition and Differentiation in the 2015 Paris Agreement: Interpretative Possibilities and Underlying Politics" (2016) 65 *International and Comparative Law Quarterly* 493 – 514.

⁹ EST transfer agenda as used here means the "favourable access to and transfer of environmentally sound technologies, in particular to developing countries, through supportive measures that promote technology cooperation and that should enable transfer of necessary technological know-how as well as building up of economic, technical and managerial capabilities for the efficient use and further development of transferred technology". See Rio Agenda 21, para. 34.4.

¹⁰ Mickelson described these two categories as "ecological debt" and "making environmental space". See Karin Mickelson, "Leading Towards a Level Playing Field, Repaying Ecological Debt, or Making Environmental Space: Three Stories about International Environmental Cooperation" (2005) 43:1/2 *Osgood Hall Law Journal* 137 at 150, 158. While sharing some fundamental similarities, the arguments canvassed on 'ecological space' and 'historical reparation' above, bear some differences from the position taken by Prof. Mickelson.

¹¹ Anil Agarwal & Sunita Narain, *Global Warming in an Unequal World: A Case of Environmental Colonialism*, loose-leaf (New Delhi: Centre for Science and Environment, 1991) 5. Cited in Mickelson, *Ibid* at 161.

The rich must reduce so that the poor can grow. Create ecological space ... If the rich emitted yesterday, the emerging rich world will do today. Cooperation demands equity and fairness. It is a pre-requisite for an effective climate agreement.¹²

Describing the ecological space argument in terms of ‘contraction and convergence’, its proponents have contended that “the North would have to undertake changes to reduce its environmental impacts ... the South would undertake a development path that would enable it to meet the aspirations of its peoples”.¹³ At the risk of simplicity, this argument, in essence, clamours for the right of developing countries to emit as much as their fledgling economies demand. For example, this entails the right to keep generating power from fossil fuel sources and continued involvement in the fossil fuel industry.¹⁴ The ecological space argument is the dominant historical position taken by developing countries in the international environmental sphere. For example, Indira Ghandi has been quoted to have argued at the 1972 Stockholm Conference thus:

The rich countries may look upon development as the cause of the environmental destruction, but to us it is one of the primary means of improving the environment of living, of providing food, water, sanitation and shelter, of making the deserts green and the mountains habitable.¹⁵

It is, therefore, not surprising that multilateral environmental agreements (MEAs) from the 1972 Stockholm Convention to the 2015 Paris Agreement (PA) reflect this argument in different forms.¹⁶

The historical reparation argument has less popularity in environmental/climate change. There are two perspectives to the historical reparation argument. The first perspective, which is similar to the ecological space argument, builds on the polluter pays principle; that is, countries historically and currently responsible for global warming should bear the cost of mitigation, adaptation, and loss and damages. It has been argued that this principle is a variant of the customary international law principle that States “should ensure that activities within their jurisdiction and control respect the environment

¹² Sunita Narain, “Global Warming in an (even more) Unequal World: A Global Deal for Effective Action” (October 2007) online: <http://www.nobel-cause.de/potsdam-2007/webcasts/presentations/Narain.pdf>

¹³ Mickelson, *supra* note 10 at 157.

¹⁴ See for example Art. 4(10) of the UNFCCC which provides in part that: “The parties shall, in accordance with Article 10 take into consideration ... developing country parties ... with economies that are highly dependent on income generated from the production, processing and export, and/or consumption of fossil fuels for which such parties have serious difficulties in switching to alternatives”.

¹⁵ Karin Mickelson, “Rhetoric and Rage: Third World Voices in International Legal Discourse” (1998) 16:2 *Wisconsin International Law Journal* 353 at 389.

¹⁶ See 1972 Stockholm Declaration, principle 11; Montreal Protocol on Substances that Deplete the Ozone Layer, art 5(1); UNFCCC, art 4(10); Paris Agreement, art 4(1).

of other States or areas beyond national control”.¹⁷ More directly, the Trail Smelter decision, where the Tribunal did not only make a transnational finding of liability but pronounced that damages be paid, lends support to this dimension of the historical reparation argument.¹⁸ Proponents of this historical reparation perspective have evolved the concept of “carbon or ecological debt”.¹⁹ Mickelson classified carbon debt into ‘damage costs’ – “costs associated with future losses to climate change” and ‘abatement cost’ – “costs associated with reducing current emissions to levels consistent with the scientific estimates of what is required to avoid interference with the global climate”.²⁰ The UNFCCC considerably mirrors the carbon debt argument by providing that “the developed country parties ... shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations”.²¹

The second perspective to the historical reparation argument is tied to the history of slavery and colonialism perpetrated by western countries in the South. As stated by Rajamani, here developing countries lay claim to the “right to development in the context of the history of colonialism, and economic and environmental exploitation perpetrated by industrial countries against developing countries, and believe that developing countries are entitled to international support...”²² It is worth noting that this argument was a central rallying cry of the Third World inspired New International

¹⁷ See Rajamani, *supra* note 5 at 74 citing *The Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion*, 1996 ICJ Rep 226, 241 – 242. See also John Knox, “The Myth and Reality of Transboundary Environmental Impact Assessment” (2002) 96:2 AJIL 291 at 294, where it was argued that the Trail Smelter principle as contained in principle 21 of the 1972 Stockholm Convention (only) requires “states to undertake due diligence to prevent significant ... transboundary environmental harm”.

¹⁸ Trail smelter case (United States, Canada) (1905 – 1982) VOL. III Reports of International Arbitral Awards at 77.

¹⁹ Paredis defined ecological debt as “the ecological damage caused over time by country A in other countries or in an area under jurisdiction of another country through its production and consumption patterns; and/or the ecological damage caused over time by country A to ecosystems beyond national jurisdiction through its consumption and production patterns; and/or the exploitation or use of ecosystems and ecosystem goods and services over time by country A at the expense of the equitable rights to these ecosystems and ecosystem goods and services of other countries or individuals”. See Gert Goeminne & Erik Paredis, “The Concept of Ecological Debt: Some Steps Towards an Enriched Sustainability Paradigm” (2010) 12 Env. Dev. Sust. 691 at 697. See also Elizabeth Bravo & Ivonne Yanez eds, *No More Looting and Destruction: We the Peoples of the South are the Ecological Creditors* (Quinto: SPEDCA, 2003) 7 – 9. See counter argument to ecological debt – Olivier Godard, “Ecological Debt and Historical Responsibility Revisited – The Case of Climate Change” (2012) EUI Working Paper RSCAS 2012/46. See also response to Godard’s argument in Richard Warlenius, “In Defence of Climate Debt Ethics: A Response to Olivier Godard” (2013) 5 Working Papers in Human Ecology (Lund University).

²⁰ Mickelson, *supra* note 10 at 155.

²¹ See UNFCCC, art. 4(3).

²² Rajamani, *supra* note 5 at 78.

Economic Order (NIEO) movement of the 1970s.²³ In the climate change context, the underlying sentiment of this school of thought was well articulated by the ex-Prime Minister of Malaysia who famously stated in Rio that:

The poor are not asking for charity. When the rich chopped down their own forests, built their poison-belching factories and scoured the world for cheap resources, the poor said nothing. Indeed they paid for the development of the rich. Now the rich claim a right to regulate the development of the poor countries. And yet any suggestion that the rich compensate the poor adequately is regarded as outrageous. As colonies we were exploited. Now as independent nations we are to be equally exploited.²⁴

Contrary to the foregoing, developed countries, typified by the position of the United States of America (USA), have emphatically rejected the allegation that they are historically culpable for global emissions.²⁵ Instead, they have contended that climate treaties which fail to impose obligations on developing States, “who will be the world’s largest emitters of greenhouse gases”, will not result “in a meaningful reduction in greenhouse gases”.²⁶ In rejecting historical culpability, developed countries have premised their provision of ‘assistance’ to developing countries on their financial and technological capacity. The United States’ special envoy to COP 15 in Copenhagen, Denmark, Todd Stern, was reported to have stated that while his country will “contribute to a fund to help fund countries deal with the effects of climate change”, and that the US recognizes its “role in putting emissions in the atmosphere”, he ‘categorically’ rejects “the sense of guilt or culpability or reparations”.²⁷ It is on the basis of this position that developed countries, in 1992, pledged 0.7% of their Gross National Product (GNP) for Official Development Assistance (ODA), and “agree to augment their aid programmes ... to ensure prompt and effective implementation of Agenda 21”.²⁸ As eminently evidenced by the position of developed States at the negotiations leading to the Paris Agreement, particularly in respect of the proposition of developing States on loss and damages, this

²³ See UNGA Res. A/RES/S-6/3201, 1974, 6th Special Sess, “Declaration on the Establishment of a New International Economic Order”, para 4(f) which provides that “the right of all States, territories and peoples under foreign occupation, alien and colonial domination or apartheid to restitution and full compensation for the exploitation, arid depletion of, and damages to, the natural resources and all other resources of those States, territories and peoples...” (NIEO Declaration).

²⁴ See U.N. Conf. Rep. A/CONF.151/26/Rev.1 (Vol. III) at 233 cited in Mickelson, *supra* note 15 at 391.

²⁵ Rajamani, *supra* note 5 at 81

²⁶ See Joyeeta Gupta, *Our Simmering Planet: Want to do about Global Warming?* (London: Zed Books, 2001) 41 cited in Mickelson, *supra* note 10 at 144.

²⁷ “U.S. will Pay into Climate Fund, but not Reparations: Todd Stern”, Reuters, (9 December 2009) online: < <https://www.reuters.com/article/us-climate-copenhagen-stern/u-s-will-pay-into-climate-fund-but-not-reparations-todd-stern-idUSTRE5B82R220091209> >

²⁸ See para 33.13 of Agenda 21.

culpability refuting stance of the developed States persists.²⁹ This position, as rightly described by Rajamani, is ahistorical, and “it seeks to wipe the colonial past from our collective memories, and start afresh, as if past patterns of exploitation have little bearing on current inequities, and the efforts of developing countries to raise them time and again are no more than special pleading”.³⁰

Prior to the PA, the global climate regime was based on a concept of differentiation which was largely a product of developing countries’ ‘ecological space’ argument and developed States’ ‘capacity’ position; hence, the nomenclature ‘common but differentiated responsibilities and respective capacity’ (CBDR/RC).³¹ The PA has however qualified CBDR/RC with the clause “in the light of different national circumstances” (CBDR/RC/NC).³² CBDRRC/NC has led to a new strain of differentiation – self differentiation.³³ Worth noting is that CBDRRC/NC is less a global consensus, being an agreement between the United States and China.³⁴ Although Rajamani & Guerin have suggested that this new qualifier implies a new form of differentiation in the areas of mitigation, transparency, finance and compliance,³⁵ it is arguable that given the context in which it was made, its relevance is largely limited to mitigation.³⁶ This is reflected in what arguably is one of the PA’s most distinct features, the requirement of “all Parties ... to undertake and communicate ambitious efforts ... with the view of achieving the purpose of” the Agreement.³⁷ This provision effectively raises the bar as regards the responsibilities of developing States. But, the Agreement does not contain a similar increase in the expectation placed on developed States to substantially bear the cost of this heightened responsibility. This becomes more apparent if Article 4(5) of the Paris Agreement is compared to Article 4(3) of the UNFCCC. Whereas the former blandly provides that “support shall be provided to developing country Parties ... in accordance with Articles 9, 10 and 11...”, without attaching the

²⁹ See Linda Siegele, “Loss and Damage (Article 8)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 225 – 228.

³⁰ Rajamani, *supra* note 5 at 87.

³¹ UNFCCC, art 3(1).

³² Paris Agreement, art 2(2).

³³ Rajamani, *supra* note 8 at 510.

³⁴ See, “U.S. – China Joint Announcement on Climate Change” (12 November 2014) online: < <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change> >

³⁵ Lavanya Rajamani & Emmanuel Guerin, “Central Concepts in the Paris Agreement and How they Evolved” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 84 – 86.

³⁶ In their joint announcement, while the United States committed to reduce its emissions by 26% - 28% below its 2005 level in 2025. China agreed to peak its CO₂ emissions around 2030 and increase “the share of non-fossil fuels in primary consumption to around 20% by 2030”. See *Supra* note 34.

³⁷ See Paris Agreement, arts. 3 & 4(4).

responsibility to developed States, the latter explicitly did. This is of immense importance to EST transfer, as Article 10 of the Agreement which covers technology transfer also failed to expressly attach responsibility to developed States.

To be clear, the argument, here, is not for a blind transplant of the UNFCCC's Annex and non-Annex classification, but a clear allocation of responsibilities, even if it will mean that a mid-zone for emerging economies, like the BRICS States, will be recognized. Such approach to differentiation should both be historical and contemporaneous. Hence, the terms 'developed' and 'developing' are employed in this nuanced context. As this chapter is focused on the evolution of the EST transfer regime, which entails a period (in the past) where the South – North dichotomy was more clear-cut, reference to 'developing' States in this chapter, except where otherwise stated, includes the BRICS States.³⁸ In subsequent chapters, however, 'differentiation' is approached in a more nuanced manner.

2.1.2 *The Transfer Pact: Extant or Expunged?*

It was argued in chapter one that article 4(3) and (5) of the Convention establish a 'transfer pact'. While the implications of the PA will be considered more closely later in this work, an interesting legal question is whether in the light of seemingly conflicting provisions under the PA, the transfer pact is expunged or extant? It should be recalled that when there are treaties on the same subject-matter, "the earlier treaty applies only to the extent that its provisions are compatible with those of the later treaty".³⁹ It is a given that the PA qualifies as a binding treaty under international law.⁴⁰ Does this then mean that Article 4(3) and (5) of the 1992 Convention being earlier than Article 10 of the Paris Agreement, is deemed expunged if the provisions are considered conflicting?

³⁸ Prior to the rounds of negotiation leading to the Paris Agreement, the G77 and China represented, largely, the interest of developing States. For the PA negotiation rounds, however, about twelve diverse 'factions' emerged. These alliances are in accordance with developing countries' "changing political and socio-economic conditions". See Jane Bulmer, Meinhard Doelle & Daniel Klein, "Negotiating History of the Paris Agreement" in Daniel Klein et al, *supra* note 35 at 50 – 53. This point, regardless, the (negotiating) position of developing States have presented a fairly united front on EST transfer. See for example the G77 and China 2017 Statement to the SBI, where they noted, *inter alia*, that "both, the TEC and CTCN should strengthen the linkages between both the Technology and Financial Mechanism..." See G77 and China, "Statement on Behalf of the Group of 77 and China at the Closing Plenary of the 47th Session of the Subsidiary Body for Scientific and Technological Advice and the 47th Session of the Subsidiary Body of Implementation (Bonn, Germany, 15 November 2017)" online: < <http://www.g77.org/statement/getstatement.php?id=171115>>. Again, although considered as an emerging economy, India made the recurrent transfer issues (patent, provision of finance on concessionary terms etc.) are key component of its NDC under the PA. See generally, "India's Intended Nationally Determined Contribution" online: < <http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>>.

³⁹ See Vienna Convention on the Law of Treaties, 1969, art. 30(3). (Vienna Convention)

⁴⁰ See the Vienna Convention, art. 2(1) which defines treaty as "an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation".

For the purposes of this work, the relevant question is whether Article 4(3) and (5) of the UNFCCC is compatible with Articles 4(5) and 10 of the PA. The answer to this question largely depends on what ‘compatible’ means. Although the Vienna Convention is silent on this, it suggests elsewhere that the provisions of an earlier treaty will only be deemed incompatible if “the two treaties are not capable of being applied at the same time”.⁴¹ Are the above provisions capable of being “applied at the same time”? I argue in the affirmative. Take Article 4(3) of the UNFCCC and Article 4(5) of the PA for examples. The absence of specifically ascribed responsibility to developed countries in the latter does not conflict with such provision in the former. In as much as the latter does not contain a positive statement absolving developed countries of responsibility, it cannot be said to conflict with the former. The position applies also to Articles 4(5) and 10 of the UNFCCC and PA, respectively. This position is again supported by Article 31(3)(c) of the Vienna Convention which provides that a treaty will be interpreted in its context, taking into account “any relevant rules of international law applicable in the relations between the parties”. The International Court of Justice has also held that an instrument should be “interpreted as producing and intended to produce effects in accordance with existing law and not in violation of it”.⁴² In its seminal work on ‘Fragmentation of International Law’, the International Law Commission (ILC), relying on Article 31(3)(c) of the Vienna Convention has proposed ‘the principle of systematic integration’ in construing and interpreting seemingly conflicting treaties.⁴³ The principle calls for the consideration of the ‘normative environment’ – other treaties relevant to the subject matter – in interpreting a treaty provision.⁴⁴ Explaining the principle, they noted that:

All treaty provisions receive their force and validity from general law, and set up rights and obligations that exist alongside rights and obligation established by other treaty provisions and rules of customary international law. None of such rights or obligations has any intrinsic priority against the others. The question of their relationship can only be approached through a process of reasoning that makes them appear as parts of some coherent and meaningful whole ... In the era of framework treaties and implementation treaties, this seems self-evident. The doctrine of “treaty parallelism” addresses precisely the need to

⁴¹ See Vienna Convention, art. 59(1)(b).

⁴² Case Concerning the Right of Passage over Indian Territory (Preliminary Objections) (Portugal v. India) ICJ Reports 1957, 142.

⁴³ Martti Koskeniemi et al, “Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law” Report of the Study Group of the International Law Commission, ILC 58th Sess., A/CN.4/L.682 at 206.

⁴⁴ *Ibid* at 208. See also Marcos Orellana, et al, “Technology Transfer in the UNFCCC and Other International Legal Regimes: The Challenge of Systemic Integration” (2010) online: <http://www.ichrp.org/files/papers/184/138_technology_transfer_UNFCCC.pdf> at 25.

coordinate the reading of particular instruments or to see them in a “mutually supportive” light.⁴⁵

The above analysis supports the assertion that Articles 4(3) and (5) of the UNFCCC, grounding what has been referred to in chapter one as the EST transfer pact, subsists, and developed States are still peremptorily obligated to “facilitate and finance ... the transfer of, or access to, environmentally sound technologies to ... developing country parties”.⁴⁶ This assertion, however, does not answer the questions of the distinct implications of the various arguments of States, particularly, developing States on EST transfer and whether the South – North dichotomy has any relevance to the transfer regime.

It is argued here that the ecological space argument of developing States is incompatible with the EST transfer case. Both positions have asymmetrical ends. As noted earlier, the thrust of the ecological space argument is that, considering that developed States have emitted the most, developing States should have a higher share of the global carbon budget. On the flipside, the clamour for EST transfer is for technologies that will make emitting needless. There is near consensus that the future of the world is closely linked to ESTs.⁴⁷ From energy to transportation, agriculture to buildings, ESTs will ever increasingly redefine the meaning of development and impact the wellbeing of people. It will not be farfetched to submit that a carbon economy will in no distant future become a marker between developed and undeveloped States. Hence, a claim to ‘ecological space’ latches the development of the South to a carbon-driven economic model, a model which is not only becoming increasingly outdated, but also environmentally and economically unsustainable. This invariably fosters the North - South ‘wealth gap’.

The argument against the current CDRRC/NC in this thesis, therefore, is not that developing States should not contribute to the global quest to reduce emissions. Rather, the argument is that there should be a concurrent concretization of the responsibility of the global North, not merely on the basis of their capacity, but also by taking cognizance of their past and current liability.⁴⁸ After all, the polluter

⁴⁵ Koskeniemi, *supra* note 43 at 208, 210.

⁴⁶ See UNFCCC, art 4(5).

⁴⁷ See Jeremy Rifkin, *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World* (New York: Palgrave Macmillan, 2011) 1 – 5.

⁴⁸ While historical liability is considered more closely in chapter five, it is worth mentioning that ‘liability’ as used in this work, entails (but not limited to) liability traceable to 1800, described elsewhere as “the beginning of mass emissions of CO₂ in the Industrial Revolution”. See David Heyd, “Climate Ethics, Affirmative Action, and Unjust Enrichment” in Lukas Meyer & Pranay Sanklecha, eds, *Climate Justice and Historical Emissions* (Cambridge: Cambridge University Press, 2017) 22 at 24. While some have argued that it is not just to impose liability retroactively since there was no

pays principle has, arguably, evolved into a general principle of international environmental law.⁴⁹ It is only equitable and just that even as developing States shift from their previous entrenched position, developed States do as well. Beyond the substantive provisions, CBDR is more about the principles of equity and justice.⁵⁰ It is in this regard that the South–North dichotomy remains relevant.⁵¹ Equity becomes a bland concept without such dichotomy. And without equity, the climate regime will, invariably, translate into an unchecked tool of hegemony, neo-colonialism and imperialism. The polluter pays principle will be revisited in more details in chapter five of this work.

The different perspectives of the historical reparation argument, earlier considered, apply aptly in an EST transfer context. The ‘capacity’ based financial and technology transfer frameworks of the international climate regime have, over time, informed a lackadaisical approach by developed States to ‘obligations’ under the climate regime. This is not unconnected to the ‘aid context’ in which these support instruments have been situated. The very nature of ‘aids’ puts the grantors in the driving seat and the grantee at their mercy. Hence, developed States attach conditions before developing States can access the ‘assistance’ provided.⁵² It is important to note that as much as the argument might be made that the South-North differentiation is no more valid and, as much as the concept of differentiation is reworked to suit the interest of developed States, the reality of the liability of developed States cannot be wished away. The realities of the evil of colonialism, slavery, the exploitation of the global South, and the atrocities of transnational companies (TNCs) remain. The

knowledge of the climate change effect of past emissions at the time it was done, (See Simon Caney, “Cosmopolitan Justice, Responsibility, and Global Climate Change” (2005) 18 *Leiden Journal of International Law* 747 - 775), others have argued that ignorance does not matter. See Lukas Meyer & Pranay Sanklecha, eds, *Ibid* at 46 at 58 – 59, and Daniel Butt, *Historical Emissions: Does Ignorance Matter?* *Ibid* at 61 – 79. The latter view is adopted in this work.

⁴⁹ Svitlana Kravchenko *et al*, “Principles of International Environmental Law” in Shawkat Alam *et al*, *Routledge Handbook of International Environmental Law* (2012) online: <<https://www.routledgehandbooks.com/doi/10.4324/9780203093474.ch3>> at 53. Former Bangladeshi Minister, Ziaur Rahman is quoted to have noted when making a case for financial support under the Montreal Protocol that “(I)est someone in this conference think of this as charity, I would like to remind them of the excellent principle of “polluter pays” adopted in the developed world”. See Rajamani, *supra* note 5 at 87. The former UN Secretary General also tied the issue of technology transfer to the ‘polluter pays’ principle. See Report on the UNCED, (3 -4 June 1992) A/CONF.151/26 (VOL. IV).

⁵⁰ See Pieter Pauw *et al*, “A State-of-the-Art Review of the Notion of Common but Differentiated Responsibilities in International Negotiations” (2014) 6 *German Development Institute Discussion Paper* at 6; Mariama Williams & Manuel Montes, “Common but Differentiated Responsibilities: Which Way Forward?” (2016) 59 *Development* 114 at 114 – 115. Online: <<https://link.springer.com/article/10.1057/s41301-017-0097-6>>.

⁵¹ As noted Williams & Montes, “CBDR cannot be out of date in a world that remains dominated by clear and prevalent asymmetries, rising inequality among countries, differential access to core technology and finance and different conditions of vulnerabilities. On the contrary, CBDR, or some notion of it, remains crucial and indispensable for the achievement of sustainable development”. *Ibid* at 114.

⁵² See generally, Brian Lai, “Examining the Goals of US Foreign Assistance in the Post-Cold War Period, 1991 - 1996” (2003) 40:1 *Journal of Peace Research* 103 – 128.

fact that the current affluence enjoyed by the global north is at the detriment of the global south remains as valid today as it was in 1992 when the UNFCCC was negotiated and Article 4(3) and (5) were agreed to by States. As extensively argued earlier, these provisions remain extant. The affirmation of the culpability of developed states in the preamble to the 1992 UNFCCC remains valid. It is contended that an equitable and effective EST transfer regime begins, not with the downplaying of these realities as the Paris Agreement has done, but with their acceptance and operationalization. It is with this background that the evolution of the climate regime on EST transfer is considered below.

2.2 The History of the UNFCCC Technology Transfer Regime

2.2.1 The Pre-1992 UNFCCC Phase

The relevance of considering the history of the EST transfer regime under the UNFCCC is aptly captured by B.S. Chimni. He said: “the road to the future ... winds its way through the past”.⁵³ It is worth repeating that history is TWAIL’s key methodological approach.⁵⁴ This is to enable the unravelling of how historical trends have subsisted till date despite surface representations of change.⁵⁵ This unmasking is crucial in climate change scholarship. Attempts to narrate the history of the climate regime often divorce the regimes from their larger socio-political context. Such historical accounts take, as their starting point, either the 1972 Stockholm Convention or the 1992 UNCED.⁵⁶ This trend is, however, not unique to climate change scholarship, as other areas of international law have been criticized for ‘cherry-picking’ history, divorcing them from their broader contexts and equating western history to global history.⁵⁷

This is why TWAIL set out to re-examine “the historical foundations of international law”.⁵⁸ As pointed out by Gathii, “TWAIL scholarship has not only rethought international law’s relationship to the colonial encounter, but has also challenged the complacency in international law to treat the colonial legacy as dead letter, overcome by the process of decolonization”.⁵⁹ As noted in the preceding

⁵³ See B.S. Chimni, “The Past, Present and Future of International Law: A Critical Third World Approach” (2007) 8 Melbourne Journal of International Law 499

⁵⁴ See generally, Obiora Okafor, “Critical Third World Approaches to International Law (TWAIL): Theory, Methodology or Both?” (2008) 10 International Community Law Review 371 – 378.

⁵⁵ See Makau Mutua, “What is TWAIL?” (2000) 94 ASIL Proceedings, 31 – 40.

⁵⁶ See for example Daniel Blobel & Nils Meyer-Ohlendorf, eds., *United Nations Framework Convention on Climate Change Handbook*, (Bonn: Climate Change Secretariat, 2006) 17 – 20.

⁵⁷ See Chimni, *supra* note 53 at 500 – 502.

⁵⁸ James Gathii, “TWAIL: A brief History of Its Origins, Its Decentralized Network, and a Tentative Bibliography” (2011) 3:1 Trade Law & Development 26 at 30.

⁵⁹ *Ibid.*

chapter of this work, crucial to the TWAIL agenda is the unmasking of presumptions and representations that underpin the global governance structure – in this case, the UNFCCC EST transfer regime. This, however, cannot be done by simply choosing 1992 as its historical reference point. It is contended that the UNFCCC EST transfer regime cannot be discussed outside the frames of two historical occurrences: the ‘oil weapon’ saga and the failed attempt to enact an International Code of Conduct on the Transfer of Technology (ICCTT). These two events occurred between the 1960s and 1980s, a period marked by the ‘independence’ of colonized States and a gradual sensitization of the world to the consequences of North-induced global environmental degradation. The argument is made below that the features of these two events have, to varying extents, characterised the various phases of the EST transfer regime, including the current framework.

Attending the independence of colonized States in the 1960s was their realization of the need to have control over the natural resources within their territories, particularly, oil and gas. Prior to this, developed States, through multinational oil companies (MNOCs), dominated these industries.⁶⁰ This led to the forming of alliances by developing States, the most prominent being in the energy sector, the Organisation of Petroleum Exporting Countries (OPEC).⁶¹ Two years after the formation of OPEC, Resolution 1803(XVII) on the “Permanent Sovereignty Over Natural Resources” was passed by the United Nations General Assembly (UNGA).⁶² Apart from affirming that “peoples and nations” have “permanent sovereignty over their natural wealth and resources”, Resolution 1803 recognises the power of States to nationalize, expropriate or requisition private interests in resource ventures for reasons of “public utility, security or the national interest”.⁶³ Developing States took advantage of this broad allowance to nationalize various MNOCs between 1960 and 1980.⁶⁴ These developments, along with the heavy dependence of the North on fossil fuel from developing States, set the stage for these States to leverage their control over oil and gas supply as a tool of political persuasion of the North.

⁶⁰ As documented elsewhere, during this period seven MNOCs – Anglo-Iranian Oil Company (now BP), Gulf Oil (now part of Chevron), Royal Dutch Shell, Standard Oil Company of New Jersey, Standard Oil Company of New York (both now Exxon Mobil) and Texaco (nicknamed the ‘seven sisters’) controlled 86% of world’s petroleum reserves. See OPEC, “Brief History of OPEC” online: < http://www.opec.org/opec_web/en/about_us/24.htm>; Ian Mann, “Shaky Industry that Runs the World”, TIMES, (24 January 2010) online: < <http://archive.li/ZOHoz>>

⁶¹ OPEC was formed in 1960 by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. See OPEC, *Ibid.*

⁶² United Nations Declaration on the Permanent Sovereignty over Natural Resource, Resolution 1803 (XVIII), 1962. (Resolution 1803)

⁶³ See Resolution 1803, paras., 1 and 4.

⁶⁴ For examples, Libya nationalized British Petroleum in 1971; Iraq expropriated American owned share of Basrah Petroleum Company in 1973 and Nigeria nationalized British Petroleum in 1979.

This has been referred to as the ‘oil weapon’.⁶⁵ Developing countries, at various times, including 1956, 1967 and 1973, employed the ‘oil weapon’.⁶⁶ The implications of these actions and the eventual influence they had on the North, can be better appreciated when the effects of the 1973 oil embargo are considered. One writer described the implications thus:

Oil import prices quadrupled. The posted price of Arabian light crude increased from \$3 per barrel in early October 1973 to \$11.65 per barrel in January 1974. Sudden inflation and economic recession ensued, leading to unemployment, the closing down of schools and offices and cuts in the production of major factories. This fact caused some to believe that ‘a staggering disequilibrium in the global balance of payment will occur that will place strains on the monetary system far in excess of any that have been experienced since the war’. The German Chancellor Helmut Schmidt explained the situation as an extraordinarily unstable one, which revealed the fragility of the elaborate system of economic relations among the nations of the world.⁶⁷

The effectiveness of the actions of developing States led developed States to realise how exposed they were. This led to the establishment of the Energy Coordinating Group (ECG) under the umbrella of the Organization for Economic Cooperation and Development (OECD) in 1974.⁶⁸ The ECG’s central mandate was “...(the) shift from a seller’s market to a buyer’s market by the enforcement of oil-saving measures and the switch to other energy sources”.⁶⁹ As reiterated in the enabling instrument of the IEA (which replaced the ECG), OECD countries agreed to undertake “long-term cooperative efforts on conservation of energy, on accelerated development of alternative sources of energy, on research and development in the energy field...”⁷⁰ Evident from the foregoing are what has been rebranded ‘renewable energy’ and ‘energy efficiency’, two of the most prominent categories of ESTs.

⁶⁵ Defined as “any manipulation of price and/or supply of oil by exporting nations with the intention of changing the political behavior of the consumer nations”. See H. Maull, “Oil and Influence: The Oil Weapon Examined” in G. Treverton, ed, *Energy and Security* (Gower Publishing, 1980) 3.

⁶⁶ The 1956 Suez Canal crisis, 1967 Suez Canal blockade 1973 Arab-Israeli war and the perceived anti-Arab stance of western countries resulted in Organization of Arab Petrol Exporting Countries (OAPEC) cutting back supplies of oil to the west. See generally, S.S. Haghghi, *Energy Security – The External Legal Relations of the European Union with Major Oil and Gas Supplying Countries* (Portland: HART Publishing, 2007)

⁶⁷ *Ibid* at 54.

⁶⁸ The ECG later became the International Energy Agency (IEA). See Richard Scott, *The History of the International Energy Agency 1974 – 1994: Origins and Structure*, Vol. 1 (Paris: OECD Publications, 1994) 47 – 48.

⁶⁹ See Henry Simonet, “Energy and the Future of Europe” (1975) *Foreign Affairs* 454

⁷⁰ Agreement on an International Energy Program, (As amended 30 November 2007), preamble. (IEP)

The above, in part, qualifies for a critical piece of the history of how renewable energy gained its prominence in the North, and invariably, the world.⁷¹ Economic imperatives actuated the actions of the West in respect to sustainable technologies, not environmental concerns. The need for energy security drove the recourse to renewable energy and efficiency practices.⁷² To claim ‘environmental leadership’ because of early leads on adopting ‘clean technology’ is, therefore, hypocritical, at best. While Northern States hide behind the more altruistic rhetoric of environmental sustainability in international climate negotiations, the priority they place on the economic benefits from ESTs over and beyond environmental concerns is difficult to hide. Take, for example, Germany’s energy transition programme – *energiewende* – of the six reasons given for the transition, five pertained to the German economy.⁷³ On green economy, the publication on the programme notes that “Germany ... is positioning itself as an innovator in green technologies ... exports made up for 65 percent of German PV production in 2013 ... and the target is 80 percent in 2020”.⁷⁴ On energy security, the publication states “... the world saw in the 1970s when OPEC restricted its oil supply to certain countries, energy imports can dry up for political reasons overnight ... the more energy a country gets from within its own borders, the less vulnerable it is”.⁷⁵

The point is not that the economy cannot benefit from sustainable energy, but that if the economy is given a ‘first-line-charge’ right, the environment will end up holding the shorter end. To frame the development and management of ESTs in the context of economic dominance and GDP growth invariably impacts how such technologies are dealt with.⁷⁶ The stronger the economic objective, the lesser the willingness to have a non-market-oriented transfer structure. As will be shown shortly, the

⁷¹ This is not to suggest that the narrative is solely responsible for the emphasis placed on renewable energy and efficiency pre-1990. Indeed, as far back as the 1972 Stockholm Convention, the potential of more sustainable means of energy production and efficient use was recognised. The point, however, is that what actuated the action of the North in this regard was not environmental concerns.

⁷² Winston Churchill is reputed to have remarked that “on no one quality, on no one process, on no one country, on no one route and on no one field must (the United Kingdom) be dependent. Safety and certainty in oil lie in variety and variety alone”. See Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (New York: Simon and Schuster, 1999) at 160.

⁷³ Craig Morris & Martin Peht, *The German Energiewende Book*, (Berlin: Heinrich Boll Stiftung, 2017) 5.

⁷⁴ *Ibid* at 11.

⁷⁵ *Ibid* at 17.

⁷⁶ A counter-argument can, however, be made that the premium placed on the market in developed states’ climate policies is motivated by political imperatives and the need to engender support from stakeholders. While this is not invalid, it is argued here that this market emphasis is beyond ‘political expediency’. It is symptomatic of the entrenched capitalist orientation of States. Importantly, the attempt to draw a line between employed terms and actual intentions becomes less defensible when it is realised that the actions of these States aligns with their market-oriented climate policies.

failure of the Rio Declaration and Agenda 21, despite envisioning an ideal EST transfer system, is attributed to this blight.

A second development that marked the ‘independence’ of Southern States in the 1960s is the formation of the ‘Group of 77’ (G77) in 1962.⁷⁷ At ‘independence’, colonised States realised that political autonomy in itself does not translate into development.⁷⁸ They indicted the North-centric international order which had been designed, without the input of the South, to advance the interest of the North.⁷⁹ This is why they called for a reformed international order which guarantees the South’s *right to development*.⁸⁰ According to Doudou Thiam, this right mandates the tearing down of practices, institutions and rules on “which international economic relations are based, in so far as these practices, institutions and rules sanction injustice and exploitation and maintain the unjustified domination of a minority over a majority of men”.⁸¹ These agitations gave rise to a series of meetings and resolutions by developing States, eventually culminating in the Declaration on the Establishment of a New International Economic Order (NIEO) in 1974.⁸² Central to the NIEO was the subject of technology transfer. It thus provides, *inter alia*, that the Order should be founded on:

...Giving to the developing countries access to the achievements of modern science and technology, and promoting the transfer of technology and the creation of indigenous technology for the benefit of the developing countries in forms and in accordance with procedures which are suited to their economies...⁸³

To operationalize the NIEO Declaration, the UNGA adopted a programme of action alongside the Declaration.⁸⁴ Item IV of the Programme requires that “all efforts should be made: a. to formulate an international code of conduct for the transfer of technology corresponding to needs and conditions

⁷⁷ The 1955 Badung Conference which held in Indonesia prefaced the establishment of the G77. The Group, originally made up of 77 countries (75 developing States, Japan and New Zealand), has since grown to about 132 countries. See “Origin of the Group of 77”, online: < <http://www.g77.org/paris/history/pdf/historyG77.pdf>>

⁷⁸ Mutua, *supra* note 55 at 34.

⁷⁹ See generally M. Rafiqul Islam, “History of the North – South Divide in International Law: Colonial Discourses, Sovereignty, and Self-Determination” in Shawkat Alam, et al., eds, *International Environmental Law and the Global South* (Cambridge: Cambridge University Press, 2015) 23 – 49. See also B.S. Chimni, “Customary International Law: A Third World Perspective” (2018) 112:1 *American J Intl L* 1 – 46.

⁸⁰ Daniel Whelan, “Under the Aegis of Man”: The Right to Development and the Origins of the New International Economic Order” (2015) 6:1 *Humanity: An Intl J of Human Rights, Humanitarianism and Development* 93 at 94.

⁸¹ Doudou Thiam’s (former Senegalese Foreign Minister) Address to the UNGA, UNGA Off. Records, 21st Sess., 1414th Plenary Meeting, September 23, 1966 cited in Whelan, *Ibid*.

⁸² NIEO Declaration, *supra* note 23.

⁸³ NIEO Declaration, para. 4(p).

⁸⁴ Resolution 3202 (S-VI), Programme of Action on the Establishment of a New International Economic Order, 6th Special Session, A/RES/S-6-3202, 1 May 1974.

prevalent in developing countries...”⁸⁵ This, alongside similar prior events, led to the Pugwash Conferences, and subsequently a draft International Code of Conduct on the Transfer of Technology (ICCTT).⁸⁶ While a detailed review of the ICCTT is outside the scope of this work, certain features which characterised its negotiations and eventual failure and their iterations in the evolution and current state of the EST transfer framework are worth noting.

To start with, the ICCTT negotiations was conducted in a siloed setting. While the G77 was proposing a mandatorily couched code which covers “all forms of technology transfer transactions, irrespective of whether the parties involved were private, public, regional or international...”, the US-led developed States proposed a non-binding instrument with “a clear distinction between ... the parties involved”.⁸⁷ Again, there was an all-out contradiction in the normative basis of both groups’ negotiating positions. While the “North sought to preserve a regime based on liberal economic principles ... the South considered technology as the common heritage of all mankind and hoped to redistribute wealth from North to South”.⁸⁸ The position on intellectual property rights (IPRs) is also telling. While the South contended stridently that IPRs are constricting development and technology transfer, the North took the position that IPRs and the monopolies they engender are “necessary evil to foster invention”.⁸⁹ The attempt of the South to negotiate technology transfer outside the aegis of the World Intellectual Property Organization (WIPO) was also resisted by the North.⁹⁰ Importantly, although in one breath calling in aid the autonomy of TNCs vis-à-vis the right to transfer technologies, developed States, in the negotiations, represented the interests of the TNCs.⁹¹ Another feature is the extensive qualification of the North’s proposed code with words like ‘unreasonably’, ‘unjustifiably’.⁹² And finally, although it failed, the final draft of the ICCTT represented, in the main, the position of developed States, with developing States either having to forego their positions or water them down

⁸⁵ *Ibid.*

⁸⁶ For a comprehensive commentary on the history of the ICCTT, See generally Surendra Patel, et al, eds., *International Technology Transfer: The Origins and Aftermaths of the United Nations Negotiations on a Draft Code of Conduct* (The Hague: Kluwer Law International, 2001).

⁸⁷ See Dennis Thompson, “An Overview of the Draft Code” in Sundera Patel, et al, eds., *Ibid* at 52 – 58.

⁸⁸ Debra Miller & Joel Davidow, “Antitrust at the United Nations: a Tale of Two Codes” in Sundera Patel, et al, eds., *supra* note 86 at 86.

⁸⁹ *Ibid* at 86 – 87.

⁹⁰ *Ibid* at 88.

⁹¹ As noted elsewhere, in the ICCTT negotiations “...most highly industrialized States, ... either identified with the needs of suppliers (TNCs) or responded to their lobbying”. *Ibid* at 86. See also, UNCTAD Secretariat, “The Rationale for Regulatory Action”, Sundera Patel, et al, eds., *supra* note 86 at 23.

⁹² Referred to as ‘the rule of reason test’. See Thompson, *supra* note 86 at 65 – 66 and Miller & Davidow, *supra* note 87 at 99.

to satisfy developed countries.⁹³ However, even the compromises made by developing States had to be pro-economy before they could be accepted.⁹⁴

The above features substantially characterise the EST transfer regime. This is not surprising, as the same normative bearings of States informed the positions taken at the negotiation of the climate regime. This reinforces the argument earlier made that developed States' climate initiatives are primarily economy-driven. This conclusion would have been different if the existential implications of climate change had influenced a position different from the one taken by developed States in the more generic ICCTT negotiation. Put together, the two pre-1992 events considered above form the foundation of the subsequent phases of the global EST transfer regime. A position well explained by the Derrick Bell's Interest Convergence Dilemma Theory.⁹⁵ Although proffered in a context of the critical race movement, the theory can be aptly applied to the climate change discourse. Re-rendered simply, the theory posits that until the North's economic and hegemonic agenda is served, it generally lacks the will to contribute to non-economic and non-hegemonic causes. While developed States are willing to accept that climate change calls for a global paradigm shift, they only support such a shift to the extent that it will not disrupt the neo-liberal and capitalist foundations of their societies.⁹⁶ The stories told above provide factual context for arguing that, at its root, the global climate regime is hugely marked by the *interest convergence dilemma*.

2.2.2 1992 – 2000 Pre-Expert Group on Technology Transfer

The UNFCCC EST regime is founded on the tripod of the 1992 UNFCCC, the Rio Declaration and Agenda 21. These instruments, read together, provide the 'gold standard' for global EST transfer, a standard which the world has increasingly fallen short of. Before these provisions and the various attempts to actualise them between 1992 – 2000 are considered, it is necessary to point out that the concept of *differentiation* was most evident in this era. The UNFCCC, and subsequently, the Kyoto

⁹³ See Miller & Davidow, *supra* note 88 at 84 – 85,

⁹⁴ For example, while the South clamoured for a binding instrument, the North want a non-binding instrument. In reaching a consensus on a 'non-binding' ICCTT, developed countries agreed with OPEC nations to completely exclude intergovernmental cartels from being caught by the anti-trust code under the Restrictive Business Practices (RBP) Code. See Miller & Davidow, *supra* note 88 at 83.

⁹⁵ Derrick Bell, "Brown v. Board of Education and the Interest – Convergence Dilemma" (1980) 93 Harv L Rev 518.

⁹⁶ This is an adaptation of Bell's description of the interest-convergence Dilemma, to wit, "The interest of blacks in achieving racial equality will be accommodated only when it converges with the interests of the whites ... There were whites for whom recognition of the racial equality principle was sufficient motivation. But... the number who would act on morality alone was insufficient to bring about the desired racial reform". See *Ibid* at 6, 8.

Protocol, generally delineated party states into Annex I, Annex II and non-annex States.⁹⁷ While Annex I included developed States and other countries described as economies-in-transition (EIT), annex II was primarily made up of developed States.⁹⁸ In the EST transfer context, this distinction is important, as it helps to understand the obligations agreed to by States under the climate framework. Art. 4(1)(c) of the Convention started by mandating all States to “promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent ... emissions”. More specifically, however, Art. 4 (5) provides that “the developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to (ESTs)”.

What is unclear is whether this provision refers only to Annex II States or all developed States contained in Annex I. To argue in support of the former suggests that the preface “the developed country parties...” is superfluous. But it is also difficult to affirm that the generic reference to ‘developed country parties’ automatically means all annex I country States. This is more so as the Convention has been clear elsewhere in conferring specific responsibilities on annex I States.⁹⁹ One way of interpreting this provision is that the phrase “...the developed country parties” allows for the inclusion of other States which experience improved economies over time to take up responsibilities under Art 4(5). Hence, a technologically and economically advanced country like South Korea, and an emerging economy like China, which are not in the Annexes, can be deemed obligated under the regime. For such countries, however, the normative basis for action will not be ‘responsibility’ but ‘capacity’. A few other points worth noting in the UNFCCC are: the clear linkage between EST transfer and finance; the extensive use of vague qualifiers (e.g. ‘practicable steps’, ‘as appropriate’); and the explicit connection of the effective implementation of developing States’ commitments under the Convention to the “effective implementation of developed country parties of their commitments ... related to financial resources and transfer of technology”.¹⁰⁰ Necessary to point out is that Art. 4(3) and (5) and, indeed, the entirety of the UNFCCC, is the product of the same conflicting positions between developing and developed States which marked the ICCTT.

⁹⁷ See generally UNFCCC, art. 4, Annexes I & 2; Kyoto Protocol, arts. 1(7) & 11(2).

⁹⁸ See UNFCCC, annexes I and II. While countries in the former USSR and Turkey were included in Annex I, they were excluded from Annex II. The EITs were believed not to have peaked in their emissions and hence do not have as much responsibilities as the more developed countries in Annex II. See also UNFCCC, art. 4(6).

⁹⁹ See UNFCCC, art. 4(2)

¹⁰⁰ See UNFCCC, art. 4(3), (5) & (7).

The Rio Declaration and Agenda 21 are not binding instruments. However, they provide clarity to the otherwise vague commitments of parties in the UNFCCC on EST transfer.¹⁰¹ Principle 9 of the Rio Declaration notes that “States should co-operate to strengthen endogenous capacity-building ... by improving scientific understanding through exchanges ... and by enhancing the development ... and transfer of technologies...” Chapter 34 of Agenda 21 provides the most comprehensive guide as to the details of the understanding of party States on EST transfer in Rio.¹⁰² The difficult and tactful melding of different positions of developing and developed States is evident in various paragraphs of Chapter 34. Take for example paragraph 34.14 which states that the Chapter’s objectives include:

To promote, facilitate and finance, as appropriate, the access to and the transfer of environmentally sound technologies and corresponding know-how, in particular to developing countries, on favourable terms, including on concessional and preferential terms, as mutually agreed, taking into account the need to protect intellectual property rights as well as the special needs of developing countries for the implementation of Agenda 21.

The above embraces the insistence of developing States on “concessional and preferential terms”,¹⁰³ even as developed States pressed for the protection of IPRs.¹⁰⁴ Agenda 21 attempted to provide workable solutions in response to these seemingly irreconcilable differences between the two sides. Some of the proposed initiatives are:

- i. The development and linkage of international information networks “through regional clearing-houses”. Such linked systems will produce “reports on state-of-the-art technology” and will

¹⁰¹ Compared to the UNFCCC, the Rio Declaration is not restricted to the climate regime, it focuses on principles for sustainable development (hence, the title ‘The Rio Declaration on Environment and Development’). Agenda 21 is a comprehensive plan of action on different subjects covered by the multiple instruments adopted at Rio in 1992. It has however been argued that although unbinding, the Rio Declaration has “the same potential as did the Universal Declaration of Human Rights”, which (UDHR) later became deemed as part of customary international law. See R.S. Pathak & Akshay Jaitly, “Rio Declaration – Economic Issues for Developing Countries” (1992) 1:3 Review of European Community & Intl Environmental Law 267.

¹⁰² Para. 34.6 of Agenda 21 states that the chapter is “without prejudice to specific commitments and arrangements on transfer of technology to be adopted in specific international instruments”. This provision effectively subjects Chapter 34 to provisions in MEAs.

¹⁰³ See for example the Statement of the Tanzanian President, Ali Hassan Mwinyi at UNCED noting that “Environmentally Sound Technologies would need to be transferred to developing countries on concessional and preferential terms to help these countries to meet the imperative of sustainable development”. See Statement of H.E. Mr. Ali Hassan Mwinyi, President of the United Republic of Tanzania, Report of the United Nations Conference on Environment and Development, *Statements Made by Heads of State or Government at the Summit Segment of the Conference*, A/CONF.151/26/Rec.1 (Vol. III).

¹⁰⁴ United States commenting on Agenda 21 states that it “strongly believes that adequate and effective protection of intellectual property rights is an essential component of any international technology cooperation effort aimed at environmental protection and/or development assistance... The United States understands the provisions ... regarding access to and transfer of technology to mean that ... subject to intellectual property rights, such access and transfer shall be on freely negotiated, mutually agreed terms that recognize and are consistent with the adequate and effective protection of those rights”. See United States Submission, *Report of the United Nations Conference on Environment and Development*, A/CONF.151/26 (vol. IV).

“operate on an information-demand basis and focus on the information needs of the end-users”.¹⁰⁵

- ii. Provision of incentives by developed countries to companies; “purchase of patents and licences on commercial terms for their transfer to developing countries on non-commercial terms...”; and “undertaking of measures to prevent the abuse of (IPRs)” in respect of privately owned technologies.¹⁰⁶
- iii. Establishment of “a collaborative network of national, sub-regional, regional and international research centres on (ESTs) ... to enhance the access to and development, management and transfer of (ESTs)”.¹⁰⁷
- iv. The promotion of “joint ventures between suppliers and recipients of technologies; taking into account developing countries’ policy priorities and objectives”.¹⁰⁸

It was projected that between \$450 million and \$600 million will be needed between 1993 – 2000 to achieve the initiatives under chapter 34.¹⁰⁹ Given the lethargy with which developed States attended to their financial commitments under Agenda 21, it is not unlikely that the projected sum was not provided.¹¹⁰ The non-actualization of the lofty aspirations of Chapter 34 cannot be divorced from the friction between developed and developing States on the principles that should underpin EST transfer. For example, while developing States at UNCED emphasised the relationship between development and environment and the responsibility of the north to do away with policies which constrict transfer of ESTs, western countries emphasised market policies, with Germany and the United Kingdom particularly referencing the then ongoing negotiations on the General Agreement on Tariffs and Trade (GATT), and subtly tying aid to “policies which encourage inward investment, including ...the principles of good government”.¹¹¹ It was in the light of this unresolved conflict that the Secretary-General of UNCED, Maurice Strong, noted that:

On technology transfer, we have agreement. But the degree of full commitment to the basic principles of that agreement is still evolving and we cannot yet measure how deep that commitment is.¹¹²

¹⁰⁵ Agenda 21, para. 34.15.

¹⁰⁶ Agenda 21, para. 34.18(e).

¹⁰⁷ Agenda 21, para. 34.21.

¹⁰⁸ Agenda 21, para. 34.28.

¹⁰⁹ Agenda 21, para. 34.29.

¹¹⁰ See generally, Rubens Ricupero, “Chronicle of a Negotiation: The Financial Chapter of Agenda 21 at the Earth Summit” (1993) 4 *Colorado J Intl Env'tl L* 81 at 96.

¹¹¹ See the submissions of the Heads of Governments/States of India, Malaysia, Tanzania, Vanuatu and G77. *Supra* note 103 at 1 - 3, 230 – 233, 187, 208 and 152 – 155. respectively. See also the submissions of Germany and Great Britain. See *Supra* note 103 at 28 and 27.

¹¹² See Statement of Maurice F. Strong, *Report of the United Nations Conference on Environment and Development*, A/CONF.151/26 (vol. IV).

Indeed, after the coming into force of the UNFCCC in 1994, the unreadiness of party States, particularly developed States, to implement the agreement, principles and action plan on EST transfer became apparent. This is clear from the proceedings and resolutions at the Conference of the Parties (COP) held between 1995 (COP 1 in Berlin) and 2000 (COP 6 in The Hague), and the reports of the Subsidiary Body on Scientific and Technological Advice (SBSTA) within the same period.¹¹³ It is worth noting that in the phase under consideration, the SBSTA was the body overseeing EST transfer initiatives. This is instructive, as the SBSTA is only advisory, not implementational. Thus, the focus of the UNFCCC in this phase was essentially consultation. Issues that recurred in the various COP Decisions on EST transfer were the need for Annex II countries to “include in their national communications the measures taken for the transfer of technology”; the need for technology needs assessment (TNA) of developing countries; the need for the development of international technology information centres (clearing houses); and the central role of the private sector in facilitating transfer.¹¹⁴ There was, however, a subtle shift from emphasising provision of information by home and host States to the development of the local absorptive capacity of the host state at COP 4 in Buenos Aires.¹¹⁵ COP 4 led to the development of the *Buenos Aires Plan of Action* and the establishment of a consultative process under the SBSTA.¹¹⁶

Despite these activities, little was done as regards implementation. This can be gleaned from SBSTA’s compilation of parties’ submissions in 1999¹¹⁷ and report on the status of the consultative process (submissions from parties) in 2000.¹¹⁸ For example, the position paper of the G77 mirrored, substantially, where developing countries were in 1992.¹¹⁹ Developing countries were still clamouring for inventories of ESTs from developed States, establishment of a technology transfer clearinghouse, provision of financial assistance, the initiation of pilot projects and the establishment of a dedicated

¹¹³ The Subsidiary Body for Scientific and Technological Advice (SBSTA) is one of the bodies established under the UNFCCC (the second is the Subsidiary Body for Implementation). The SBSTA is to provide the COP and other subsidiary bodies with “timely information and advice on scientific and technological matters relating to the Convention”. See UNFCCC, art. 9.

¹¹⁴ See Decision 12/CP. 1, FCCC/CP/1995/7/Add.1; Decision 7/CP. 2, FCCC/CP/1996/15/Add.1; Decision 9/CP.3, FCCC/CP/1997/7/Add.1; Decision 4/CP.4, FCCC/CP/1998/16/Add.1 and Decision 9/CP.5, FCCC/CP/1999/6/Add. 1;

¹¹⁵ See Decision 4/CP.4, FCCC/CP/1998/16/Add.1, paras. 1 and 4.

¹¹⁶ See *Ibid*, Decision 1/CP.4, *Ibid* & Decision 4, CP.4, Para. 9.

¹¹⁷ SBSTA, 10th Sess., (1999) Development and Transfer of Technologies – Submissions from Parties: Part One, FCCC/SBSTA/1999/MS.C.5

¹¹⁸ SBSTA, 13th Sess., (2000) Development and Transfer of Technologies – Status of the Consultative Process (Submission of Parties) online: <<https://unfccc.int/resource/docs/2000/sbsta/misc04.htm>>

¹¹⁹ See, Paper No. 3: Group of 77 and China, *Ibid*.

fund within the financial mechanism to aid capacity building and effective transfer.¹²⁰ While the Kyoto Protocol which was signed in 1997 and came into force in 2005 will be looked at in a later chapter of this work, it is important to note that in their 2000 communication, the G77 noted that the “CDM shall not be seen as a mechanism to implement Article 4.5 of the Convention”.¹²¹ On the contrary, the United States sees the CDM as providing “important incentives to enhance the transfer of ESTs and the implementation of Article 4.5”.¹²² Particularly, the G77 demanded the establishment of a Transfer of Technology Mechanism with institutional and funding sub-mechanisms.¹²³ As noted earlier, one of the emphases of the COP decisions between 1995 – 2000 was the conduct of TNAs in developing States. There are, however, no commensurate initiatives to meet assessed needs. For example, in 1998, the SBSTA conducted a survey of technology needs with an extensive participation by developing States.¹²⁴ The survey highlighted energy, transportation, agriculture, forestry and coastal zone management as the key areas of needs of surveyed countries.¹²⁵ There is no proof that anything was done about these identified needs. Rather, similar assessments have been conducted repeatedly over the years, but without commensurate implementation.

2.2.3 2001 – 2007 Expert Group on Technology Transfer

COP 7 which was held in Marrakesh in 2001 is generally believed to be another landmark in the international climate regime. The Marrakesh Accords, which included extensive decisions on capacity building and EST transfer, were some of the stand-out features of the Conference. More importantly, however, is the establishment of the Expert Group on Technology Transfer (EGTT) and adoption of the Framework for Meaningful and Effective Actions to enhance the Implementation of Article 4(5) of the Convention (Framework).¹²⁶ The terms of reference of the EGTT included analysing and identifying “ways to facilitate and advance technology transfer activities”.¹²⁷ The Expert Group was to report to the SBSTA, and its progress and continued relevance were to be appraised after five years

¹²⁰ *Ibid.*

¹²¹ *Ibid.*

¹²² *Supra* note 118.

¹²³ *Ibid.*

¹²⁴ SBSTA, 8th Sess., 1998, *Development and Transfer of Technologies – Technology and Technology Information Needs Arising from the Survey of Developing Country Parties*, FCCC/SBSTA/1998/INF.5

¹²⁵ *Ibid.*

¹²⁶ See Decision 4/CP.7, FCCC/CP/2001/13/Add.1, paras. 1 & 2.

¹²⁷ *Ibid.*, para. 2. See also, “Terms of Reference to Expert Group on Technology Transfer”, Appendix to Decision 4/CP.7, FCCC/CP/2001/13/Add.1.

(COP 12).¹²⁸ Arguably, the framework established under COP 7 marked the clearest transition in what should be the focus of the global EST transfer project. It is worth recalling that under the UNFCCC and Rio 21, there was a recognition that while developing countries must develop absorptive capacities and enabling environment, a greater responsibility lies on developed States to ensure access to and availability of ESTs. Under the COP 7 Technology Transfer Framework, however, it was stated under the header “Overall Approach”, that “the successful development and transfer of ESTs and know-how requires a country-driven, integrated approach, at a national and sectoral level”.¹²⁹ Consistent with this focus, the Framework emphasised TNA, technology information, enabling environments, capacity building and mechanisms for technology transfer, as its five components.¹³⁰

The argument here is not as to the inappropriateness of the identified components, but more on the reversal of roles. Indeed, while reference was, no doubt, made to the ‘supportive’ role to be played by developed countries, these roles were, at best, only passively framed.¹³¹ Although the Framework nibbled at various provisions in Chapter 34 of Agenda 21, it marked a substantial move away from Agenda 21’s lofty aspirations. For instance, it was silent on the initiatives to be taken by developed States to get around the patent barrier which Chapter 34 clearly articulated. Worth noting also is that while financial support was referenced under different components, it was not made a stand-alone component. When it is appreciated that when the G77 proposed the technology transfer mechanism in 2000, it identified funding as one of two sub-components,¹³² the ancillary role given to it under the Framework becomes more suspect. Despite the foregoing, the EGTT phase signaled a step away from the inertia of the pre-EGTT phase. Significantly, in attempting to meet Chapter 34’s recommendation of the establishment of an information clearinghouse, an online platform - TT: CLEAR – was developed in 2001. Like the Framework, however, TT: CLEAR is another example of the watering down of the intentions of Chapter 34. The platform contains more information on the institutional working of the UNFCCC and its specialized bodies, than it does on information on “available

¹²⁸ *Ibid.*

¹²⁹ “Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4, Paragraph 5, of the Convention”, Annex to Decision 4/CP.7, FCCC/CP/2001/13/Add.1, para. 2.

¹³⁰ *Ibid.*, paras. 3 – 22.

¹³¹ For example, the Framework stated that “...developing country Parties, are encouraged to undertake assessments of country-specific technology needs, subject to the provision of resources, as appropriate to country-specific circumstances, from developed country parties... Developed country parties ... are urged to facilitate and support the needs assessment process, recognising the special circumstances of least developed countries”. *Ibid.*, para 5 & 6.

¹³² *Supra* note 118.

technologies, their sources, their environmental risks, and the broader terms under which they may be acquired”.¹³³

The EGTT’s most substantial achievement is, perhaps, the standardization of the TNA process for developing countries.¹³⁴ Further to this, the first synthesis report on the technology needs of developing States was published in 2006.¹³⁵ It is necessary to point out the similarities in the findings reached in the 1998 TNA survey and 2006 synthesis report. For example, both inquiries indicated energy, transportation, industry, agriculture and forestry as the primary mitigation sectors identified by developing countries.¹³⁶ Again, finance and information were ranked as the major barriers in both reports.¹³⁷ The second and third synthesis reports compiled in 2009 and 2013 respectively reached similar findings as the 1998 and 2006 conclusions.¹³⁸ This informs a couple of conclusions. One is that it shows that little or no action was taken on identified needs, hence, the recurrence of the same needs over a span of about fifteen years. Two, it unmasks as incorrect, the representation that TNAs are more pivotal to EST transfer than the responsibilities of developed States. Again, like the pre-EGTT phase, no substantial progress was made to facilitate actual transfer of ESTs during the EGTT phase. This said, however, one of the phase’s bright spots is the recognition of the need to more effectively link the technology and financial mechanisms. Hence, it was emphasised in COP 13 in Bali that the Global Environment Facility (GEF), “as an operating entity of the financial mechanism of the Convention, should provide financial support for the technology transfer framework”.¹³⁹

2.2.4 *2008 – 2010 Poznan Strategy*

While the EGTT was reconstituted for five more years in 2007,¹⁴⁰ a more momentous development that occurred in 2008 was the establishment of the *Poznan Strategic Programme in Technology*

¹³³ See “About TT: CLEAR”, online: < <http://unfccc.int/tclear/about> >. See also, Agenda 21, para. 34.15.

¹³⁴ See R. Gross et al, *Conducting Technology Needs Assessments for Climate Change* (New York: UNDP, 2004). See a more recent version – Sarwat Chowdhury, et al, *Handbook for Conducting Technology Needs Assessment for Climate Change* (New York: UNDP, 2010)

¹³⁵ *Synthesis Report on Technology Needs Identified by Parties not Included in Annex 1 to the Convention*, SBSTA, 24th Sess, FCCC/SBSTA/2006/INF.1 (2006) (First Synthesis Report).

¹³⁶ See *Supra* note 129. See also *Ibid*, 31.

¹³⁷ See *Supra* note 129. See also *Ibid*, 25.

¹³⁸ See generally, *Second Synthesis Report on Technology Needs Identified by Parties not Included in Annex 1 to the Convention*, SBSTA, 30th Sess, FCCC/SBSTA/2009/INF.1 (2009) (Second Synthesis Report) & *Third Synthesis Report on Technology Needs Identified by Parties not Included in Annex 1 to the Convention*, SBSTA, 39th Sess, FCCC/SBSTA/2013/INF.7 (2013) (Third Synthesis Report).

¹³⁹ *Development and Transfer of Technologies under the Subsidiary Body for Scientific and Technological Advice*, Decision 3/CP.13, UNFCCCOR, 2007, FCCC/CP/2007/6/Add.1, 12 at 14.

¹⁴⁰ *Ibid*, para. 3.

Transfer (PSP) by the GEF.¹⁴¹ The PSP was the result of Decision 4/CP.13 reached in Bali requesting the GEF to, “in consultation with interested Parties ... elaborate a strategic programme to scale up the investment for technology transfer to help developing countries...”¹⁴² Further to this mandate, the GEF designed the PSP where it highlighted “three funding windows” to be supported under the programme; that is, TNAs; piloting priority technology projects; and “dissemination of GEF experience and successfully demonstrated technologies”.¹⁴³ The GEF committed about \$50 million to these windows, with the technology demonstration (pilot) component allocated four-fifth of the fund.¹⁴⁴

In apparent recognition of its limited fund, eligible countries were limited to receiving not more than \$1 – \$3 million for a maximum of one project. In 2010, the GEF proposed a Long-Term Program on Technology Transfer (LTP) to COP 16.¹⁴⁵ The LTP added two windows to the PSP: public-private partnerships (PPPs) for technology transfer and support for climate technology centres and a climate technology network.¹⁴⁶ The PSP and LTP are the closest developing States have gotten to their clamour for a special fund for technology transfer since the inception of the climate regime. It is worth noting that the PSP and LTP were also the first deliberate efforts to give effect to the TNA conducted in or by developing States, as both programmes tailored funding to TNA findings.¹⁴⁷ An obvious let-down, however, is the project and funding constraint in the programmes. It appears that the State-by-State funding model of the GEF is inefficient considering its limited resources. The prioritization of regional capacity building projects seems to be a more sustainable pattern. For example, making an investment in an R&D and manufacturing centre for the West African region seems more effective than funding one technology per country. This is even particularly so as the UNFCCC’s 1998 survey showed only minute differences in the technological needs of developing countries.¹⁴⁸

¹⁴¹ The PSP was originally named “Strategic Program to Scale Up the Level of Investment in the Transfer of Environmentally Sound Technologies” by the GEF, before it was changed by the COP. See *Development and Transfer of Technologies*, Decision 2/CP.14, UNFCCCOR, FCCC/CP/2008/7/Add.1, 3.

¹⁴² See *Development and Transfer of Technologies Under the Subsidiary Body for Implementation*, Decision 4/CP.13, UNFCCCOR, 2007, FCCC/CP/2007/6/Add.1, para. 3.

¹⁴³ *Elaboration of a Strategic Program to Scale up The Level of Investment in the Transfer of Environmentally Sound Technologies*, GEF, GEF/C.34/5.Rev.1 (2008), 14 – 16.

¹⁴⁴ *Ibid*, 14, 15.

¹⁴⁵ *Implementing the Poznan Strategic and Long-Term Programs on Technology Transfer*, (2012) online: <https://www.thegef.org/sites/default/files/publications/GEF_PoznanTT_lowres_final_2.pdf> 6.

¹⁴⁶ *Ibid*, 6.

¹⁴⁷ *Supra* note 143 at 15.

¹⁴⁸ *Supra* note 124.

2.2.5 2010 –Technology Mechanism

The EGTT phase came to an end at 2010 COP 16 in Cancun, two years before it was due for appraisal.¹⁴⁹ The premature termination of the EGTT was essentially due to dissatisfaction with its non-implementation role.¹⁵⁰ Hence, in 2008, the G77 & China submitted a proposal to the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA) which had been constituted the year before at Bali, Indonesia. A review of this proposal is key to appreciate its radical difference from the eventual make-up of the mechanism. In the proposal, the G77 gave the premise for the mechanism thus:

Currently, access to financing is limited, and should be enhanced to deliver technology development, deployment, adoption, diffusion and transfer to non-Annex I Parties. Barriers to technology transfer also inhibit the adoption of environmentally sustainable technologies in non-Annex 1 Parties, highlighting the urgency for access to these technologies while balancing rewards for innovators with the common good of humankind, including jointly developed technology and intellectual property rights (IPR) sharing.¹⁵¹

With this preface, a two-body mechanism made up of an *Executive Body on Technology* (EBT) and *Multilateral Climate Technology Fund* (MCTF) was proposed. The EBT was to be made a subsidiary body of the Convention and should be supported by: Strategic Planning Committee (SPC), Technical Panels, Verification Group and Secretariat.¹⁵² The MCTF on the other hand was to “provide technology-related financial requirements as determined by the Executive Body”. The proposal further envisaged a *Technology Action Plan* (TAP) which would “include clear actions and dates for the first three years, and will be updated for successive three-year periods”.¹⁵³ The TAP was to “support all stages of the technology cycle” and develop policies on public domain technologies, patented technologies and future technologies.¹⁵⁴ The proposal also identified accessibility, affordability, appropriateness, adaptability, provision of full incremental costs, adequacy and predictability of funds and the removal of barriers for EST transfer, as the guiding criteria of the

¹⁴⁹ *Reports of the Conference of the Parties on its Sixteenth Session, held in Cancun from 29 November to 10 December 2010*, Decision 1/CP.16, UNFCCCOR, 2010, FCCC/CP/2010/7/Add.1, para. 124, (Decision 1/CP.16).

¹⁵⁰ Dalindyabo Shabalala, “Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility but Common but Differentiated Responsibilities” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016) 184.

¹⁵¹ *Proposal by the G77 & China for A Technology Mechanism under the UNFCCC*, online: <http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/technology_proposal_g77_8.pdf>

¹⁵² The SPC is to develop strategy for EST transfer; technical panels are to generate and compile expert information on subjects relating to capacity building and transfer; verification group is to verify financial and technological contributions and the Secretariat is to “support and facilitate the activities of the Executive Body”. *Ibid*, 2

¹⁵³ *Ibid*, 3.

¹⁵⁴ *Ibid*.

mechanism.¹⁵⁵ It is interesting to note that TNA was not part of this proposal. Given its exclusion, it is not farfetched to contend that developing States do not give the same pride of place to TNAs as done by developed States and the UNFCCC.

The G77 and China proposed mechanism was, in the actual sense, not novel, as it only summarised their position from the ICCTT negotiation phase. It was, therefore, not surprising that developed countries rejected it. As noted elsewhere, developed countries largely took a more commercial perspective to EST transfer and were particularly “wary of concessions in the technology discussions which could adversely impact their competitiveness” in light of China and India’s growing technological capacity.¹⁵⁶ A compromise, in principle, was however reached at COP 15 in Copenhagen, where parties agreed to a Mechanism consisting of a *Technology Executive Committee* (TEC) and a *Climate Technology Centre* (CTC).¹⁵⁷ These two components were essentially a break-up of the G77 proposed EBT, with the MCTF component completely removed. Despite this relative progress, various vital issues were unresolved in Copenhagen. Chief among these were linkage of the mechanism to finance¹⁵⁸ and intellectual property rights.¹⁵⁹ Naturally, while G77 and China wanted an explicit linkage between the financial and technology mechanisms, and the provision of new and additional funding to meet the full incremental costs of mitigation and adaptation, developed countries wanted both regimes to remain distinct.¹⁶⁰ Again, while developing States wanted the mechanism to recognise IPRs as a barrier and sought the creation of initiatives like a “Global Technology Intellectual Property Rights Pool for Climate Change that promotes and ensures access to Intellectual Property protected technologies and the associated know-how...”, developed States insisted that no reference should be made to IPRs in the text, preferring that issues pertaining to IPRs are dealt with in the WTO context.¹⁶¹ Unsurprisingly, the developed countries prevailed. Neither was there a link between the

¹⁵⁵ *Ibid*, 3.

¹⁵⁶ “The Climate Technology Mechanism: Issues and Challenges”, (2011) ICTSD Information Note Number 18, online: < <https://www.ictsd.org/downloads/2011/04/technologymechanism.pdf> > 3

¹⁵⁷ *Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention: Draft Conclusions Proposed by the Chair*, Draft Decision -/CP.15, UNFCCCOR, 2009, FCCC/AWGLCA/2009/L.7/Add.3, paras 7 - 20.

¹⁵⁸ *Ibid*, paras 8, 14.

¹⁵⁹ *Ibid*, para. 17.

¹⁶⁰ See Heleen de Coninck & Ambuj Sagar, “Technology Development and Transfer (Article 10)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 263.

¹⁶¹ *Supra* note 156 at paras. 17

technology and financial mechanisms nor was any reference made to IPRs in the Technology Mechanism (TM) agreed to at Cancun in 2010.

Although the substance of the TM vis-à-vis the Paris Agreement is the subject of a later chapter, it is worth noting that the TM marked an almost total break from Chapter 34 of Agenda 21. If there is any doubt to this break-away, such can be dispelled by referencing the preamble to the TM which merely stated that “recalling the commitments under the Convention, in particular Article 4, paragraphs 1, 3, 5, 7, 8 and 9”.¹⁶² Virtually every other COP decision from 1995 referenced Chapter 34. The content of the TM shows that the exclusion of Chapter 34 was not indeliberate. As shown later, whereas the TM was conceived to remedy the bare policy making status of the EGTT, it has only reincarnated and proliferated the EGTT. Arguably, although the Climate Technology Centre and Network (CTCN) is represented as the implementation arm of the TM, while the TEC is to be the policy making arm, the CTCN does little or no implementation. As aptly put by Shabalala, “...the CTCN does not have an implementation mandate and, for the moment, appears limited to providing advisory services to developing countries”.¹⁶³ Again, the suggestion that the CTCN represents a novel creation is quickly negated when it is realised that like the EGTT, the primary preoccupation of the CTCN is the conduct of TNAs.¹⁶⁴

While the above historical analysis might not be exhaustive, it provides a basis for certain conclusions on the dynamics of the global EST transfer structure. Evidently, despite the different labels, little has changed between the 1960s when the NIEO was conceived and 2015 when the Paris Agreement was signed. The positions of developing and developed States have not changed, developed States’ positions still shape and inform the regime, and economic considerations still override existential concerns. Further, there has been more focus on an appearance of progress than actual progress. This is about the only explanation for the reiteration of policies which were evidently ineffective and the willingness of developed States to only consent to proposals which have no concrete impacts. What defies comprehension, however, is why developing States, have over the years, consented to ‘white-elephant’ agreements. A similar question was posed by Miller and Davidow when the South agreed to the *Restrictive Business Practices Code*, despite it reflecting Northern neo-liberal ideals and substantially leaving out proposals by developing countries.¹⁶⁵ These writers suggested that such an

¹⁶² *Supra* note 149 at 18. Also see *Supra* note 159 at 2 – 3.

¹⁶³ *Supra* note 150 at 184.

¹⁶⁴ *Supra* note 149 at 123.

¹⁶⁵ *Supra* note 88 at 85.

agreement represented a shift, however little, from where the countries were and after various stalemates, it gives an appearance of foreign policy gains to their domestic audience.¹⁶⁶ Another reason can be gleaned from B.S. Chimni's work. Chimni argued that transnational capitalist class and influential segments of the middle class in emerging economies (and other developing States) "have come to occupy ideological heights" in such States.¹⁶⁷ Hence:

...the interest of the transnational capital in the emerging powers broadly coincides with that of its counterparts in the advanced capitalist world ... the TCC has used its economic clout and ideological primacy to shape the foreign economic policy of emerging powers. This understanding explains why there is less and less opposition of these powers to structures of global capitalism and international laws and institutions that support it despite *continuing to be subjected to imperialist exploitation*.¹⁶⁸

2.3 Lessons from History: UNFCCC Technology Transfer Regime Fault Lines

That the UNFCCC has failed to effectively steward an equitable and efficient global EST transfer framework is no longer in question. The above analysis provides context for understanding this failure. A standout observation from the foregoing is the repetition of the same processes and initiatives in different forms. This is not surprising, as structures and initiatives are products of normative persuasion. Since parties have maintained the same normative positions, the EST transfer regime has, in substance, remained the same. Indeed, it is arguable that as far as EST transfer is concerned, the current *Technology Mechanism* phase represents a drawback on the gains made in Rio in 1992. The point must be made that the mutation of the *differentiation* principle under the Paris Agreement has no marked impact on EST transfer. If anything, as Ferreira recently pointed out, "the principle of differentiation in IEL does not fulfill the function of promoting a just global socio-economic and political order".¹⁶⁹ As noted earlier, CBDRRC-NC only raised the bar for the South while, arguably, watering down the responsibility of the North. The history of the global EST transfer regime, as traced above, exposes the false baselines on which it has been built. Falsities of will, motive and segmentation have characterised this regime. While will and motive go to the normative baseline on which the regime is framed, falsity of segmentation exposes the weakness in its structural construct. Both the normative and structural false baselines are considered briefly below.

¹⁶⁶ *Ibid.*

¹⁶⁷ B.S. Chimni, "Capitalism, Imperialism, and International Law in the Twenty-First Century" (2012) 14 Oregon Review of International Law 17 at 34.

¹⁶⁸ *Ibid* at 34 – 35.

¹⁶⁹ *Supra* 6 at 41.

2.3.1 The Normative Fault Line(s)

The EST transfer regime reflects the normative clash between the North and the South - the North's neo-liberalism and the South's 'humanism'. Whereas the North has insisted on the dominance of the market place, the South has emphasised right to develop, the existential need of their people, and the liability of the North. But the regime's history is also the story of Northern victory. The victory of neoliberalism and commercialism in a realm (climate change) that admittedly threatens life as it is presently known. Worse still is the pretension that developed States have committed themselves to the climate change cause for altruistic reasons, or that there is the will to do what needs to be done to roll back the scourge. The above analysis, from the pre-1992 phase to the current technology mechanism phase, reveals that developed States neither have the will nor a genuine interest in taking the required steps in a climate change world. Falsities of will and motive underscore the actions of the North in the EST regime as to the concessions they make and the proposals they support. The Clean Development Mechanism (CDM) under the Kyoto Protocol is perhaps one of the most persuasive pieces of evidence for this assertion. The CDM, which will be considered more closely later in this work, was a *quid pro quo* arrangement. In return for climate change mitigation projects, developed countries are awarded certified emission reductions (CER). As noted elsewhere, although the 'sustainable development' of developing States was 'mouthed' in Article 12 of the Kyoto Protocol, "the ... driver of CDM is not technology transfer but the generation of CERs to assist Annex I parties to close the gaps in Kyoto commitments and in the EU Emissions Trading Scheme".¹⁷⁰ It is therefore not surprising that of 1000 projects surveyed in 2011, only about 20% of renewable energy projects conducted under CDM resulted in 'some level' of technology transfer.¹⁷¹

It is, indeed, contestable that the climate regime is a product of North – South compromise.¹⁷² While this might have some semblance of truth at the level of one-off initiatives and projects, it appears less true at the normative level. Aptly rendered elsewhere, "there is a stark difference between cooperation based on power, and cooperation based on solidarity".¹⁷³ What has been at play in the climate regime is the "cooperation of power". The norm of the powerful prevails, while the shell-like request of the not-powerful are consented to. But these 'consents' are still defined and operated through the norm of

¹⁷⁰ Gary Cox, "The Clean Development Mechanism as a Vehicle for Technology Transfer and Sustainable Development – Myth or Reality" (2010) 6 Law, Environment and Development Journal 179 at 195.

¹⁷¹ Igor Shishlov & Valentin Bellassen, "10 Lessons from 10 Years of the CDM" (2012) 37 Climate Report 29.

¹⁷² Rajamani, *supra* note 8 at 506, 514.

¹⁷³ Mickelson, *supra* note 10 at 170.

the powerful. The neoliberal ideal which underpinned the North's approach to the failed ICCTT in the 1970s remains the same today. The point was made by the American delegates to UNCED thus: "the American life-style is not up for negotiation".¹⁷⁴ Whether directly said or subtly implied, this has, to various degrees, been the position of the North. No doubt, there is an agreement that energy sources must change, and efficient habits must be cultivated. But this must be done on the existing economic template. However, as noted by Mickelson, "if the economy is ever-present and its centrality unquestioned ... the environment is almost completely absent".¹⁷⁵ This argument is not that economic development negates environmental sustainability, but that the latter has primacy over the former. If the EST regime is re-imagined and refashioned on the basis of the foregoing assertion, a more effective, efficient and equitable EST transfer regime will no doubt be achieved.

2.3.2 The Structural Fault Lines¹⁷⁶

The structure of the UNFCCC EST transfer regime attests to the above normative falsities of will and motive. As shown above, there is no substantial difference in the actual workings of the various UNFCCC bodies (SBSTA, EGTT, TEC and CTCN) which have been saddled with EST transfer over the years. They have on the overall been saddled with the policy making and information gathering responsibilities. For example, none of these bodies has the responsibility of directly engaging in R&D. Neither has any of the bodies facilitated a portal containing comprehensive information on EST know-how. Rather, these bodies have been fixated on the conduct of TNAs, without more. The transition from one body to another has been shown to largely be transitions in names but not in substance. The G77 2008 proposal had the potential to reverse the trend, but it was opposed by the North.

In B.S. Chimni's words, "alienation is ... inscribed at the heart of international law".¹⁷⁷ To substantiate this point, he subjected international law to the crucibles of Karl Marx's four kinds of 'alienation'.¹⁷⁸ Applying 'the alienation of human beings from nature' category to climate change, he stated that:

...the intrinsic and sacred unity between man and nature is subjected to market fundamentalism, leading to the dysfunctional commodification of nature ... (objectification)

¹⁷⁴ Philip Elmer-Dewitt, "Summit to Save the Earth: Rich vs. Poor", TIME Magazine, (1 June 1992) online: <<http://content.time.com/time/magazine/article/0,9171,975656-9,00.html>>

¹⁷⁵ *Supra* note 10 at 165.

¹⁷⁶ This section adapts, in part, a research prospectus submitted in the graduate seminar class at the Schulich School of Law, in the 2017/2018 session.

¹⁷⁷ Chimni, *supra* note 53 at 502.

¹⁷⁸ The alienation of human beings from nature; the alienation of humans from their own productive activity; the alienation of human beings from their 'species being'; and the alienation of humans from each other. *Ibid* at 504.

both humans and nature in the pursuit of profit ... Unsurprisingly, international environmental law is unable to seriously respond to the global ecological crisis”.¹⁷⁹

This alienation finds expression in the UNFCCC EST Transfer regime. A few examples will suffice. One is the cosmetic distinction between publicly and privately-owned ESTs, when it has been established that most developed States have stakes in key ESTs. Another example is the insistence of developed countries on the separation of the financial and technology mechanisms under the UNFCCC.¹⁸⁰ This segmentation, which was insisted on by developed States under the cloak of the desire for efficiency and effectiveness, is one major problem for the current technology mechanism. According to a 2017 independent report to COP 23, “a lack of funding ... (is) putting at risk the CTCN’s operations. Limited financial resources have been a major impediment to the delivery of targets.”¹⁸¹ Another example is the odd separation of technology transfer from capacity building, despite that the former is deemed to include the latter. Indeed, the Paris Agreement envisages a different institutional arrangement to oversee capacity building.¹⁸² More is said on this ‘alienation’ in chapter four.

Mickelson’s satirical reference to the action of Americans in rejecting aerosols at the height of the global warming consciousness in the 1970s, sums up the findings and arguments made in this chapter. She noted that: “changing deodorants is a far cry from changing lifestyles, and it is the latter that may be required if a meaningful response to climate change is to be crafted”.¹⁸³ So far, what has happened in respect of the UNFCCC EST transfer regime is akin to ‘changing deodorants’. Different ‘fragrance’, the same ‘system’. After a while, the temporariness of the fragrance wear-off, and the ‘odour’ of ineffectiveness and inequity hits our collective ‘nostrils’. Even after then, we only change the deodorant, as has been done with the extant EST transfer framework.

¹⁷⁹ *Ibid* at 504.

¹⁸⁰ “While developing countries generally argue for a stable funding situation, preferably through a hard link between the UNFCCC’s FM (the Green Climate Fund (GCF) and the Global Environment Facility (GEF)), developed countries have been resisting calls for this. They feel that the GCF should be autonomous in spending its funds efficiently on those actions that the experts within the GCF feel will generate most mitigation and adaptation benefits”. See Coninck and Sagar, *supra* note 160 at 263.

¹⁸¹ “Report on the Independent Review of the Effective Implementation of the Climate Technology Centre and Network”, FCCC/CP/2017/3, 14. See also *Ibid* at 275.

¹⁸² See Paris Agreement, art. 11(5).

¹⁸³ Mickelson, *supra* note 10 at 169.

CHAPTER 3: A PERFORMANCE ANALYSIS OF INTERNATIONAL TECHNOLOGY TRANSFER PROGRAMMES IN AFRICA

While the socio-political history of the UNFCCC EST regime has been considered in chapter two, this chapter takes a closer look at different transfer pathways within and outside the UNFCCC framework. Although these pathways are not exhaustive, they represent some of the mainstream instruments through which ESTs has been or are being transferred. The conclusion reached in chapter two as per the normative and structural false baselines underpinning the global EST regime is further accentuated here.

3.1 The International EST Transfer Regime: Complexities and Mapping

The international EST transfer system is complex. Although the UNFCCC occupies an arguably central role in coordinating transfer initiatives, diverse entities, including State and non-State entities, are more directly involved in the transfer ‘venture’. This multi-layered transfer system makes it difficult to assess the overall effectiveness of the transfer regime under the UNFCCC. The complexity becomes more evident when it is realised that the UNFCCC primarily plays a facilitative rather than an operational role in the transfer matrix. The 1992 Convention, for instance, mandates “developed country parties and other developed parties included in Annex II” to “promote, facilitate and finance” EST transfer, while also admonishing “other parties and organizations in a position to do so” to assist in facilitating transfer.¹

The difficulty in assessing the transfer of ESTs is made more so by the heterogeneity of ESTs and the unique features and demands of each. As noted in chapter one, ESTs can either be mitigation or adaptation focused. But this binary categorisation masks the diverse technologies that can be grouped under each category. For example, while both solar PV and wind turbines are mitigation ESTs, they have peculiar features, and these greatly impact on their development, use, transfer and diffusion. Again, although drought resistant seeds and advanced irrigation systems are both agricultural-adaptation ESTs, they have inherent features which make their conditions for transfer diverse. John Barton, focusing on mitigation ESTs, noted the different market dynamics for solar PV, biofuel and wind technologies and the implications for transfer.² Articulating the near-impossibility of appraising the EST transfer regime, the IPCC stated:

¹ UNFCCC, art. 4(5).

² John H Barton, “Intellectual property and access to clean energy technologies in developing countries: An analysis of solar photovoltaic , biofuel and wind technologies” (2007) 2 ICTSD Programme on Trade and Development 18.

Measuring technology transfer is difficult given the diverse and complex ways in which transfer occur. It would be so even if the task were confined to quantifying the transfer of hardware. When “software” elements such as education and training are included in a broad definition of technology transfer ... the task is further complicated; it becomes almost impossible if some judgment about effectiveness is also demanded. “How much effective technology transfer related to climate change mitigation or adaptation takes place between countries each year?” is an interesting question, but one that cannot be answered with any confidence.³

The difficulty notwithstanding, appraising the performance of the EST transfer regime is vital, not just for the determination of the effectiveness or otherwise of the regime, but for perspective on the reasons such initiatives and/or policies succeeded or failed. To effectively appraise the international EST transfer regime, it is important to first identify the initiatives or programmes to be reviewed, after which, performance indicators must be established. The point should be made that what is being considered in this chapter is not the effectiveness of ESTs *per se*. Rather, the chapter is focused on determining how (pre-technology framework) EST transfer initiatives performed and the conditions responsible for such performance. In later sections, consistent with Article 4(5) of the UNFCCC which recognised the roles of States and non-State parties in EST transfer, initiatives by such parties will be reviewed. This review will be done, in part, by considering the national communications submitted by the United States, European Union and Japan in 2006, 2010 and 2014.⁴

Under Article 12(1)(3) of the UNFCCC, developed States are obligated to communicate to the Conference of the Parties (COP), details of measures taken in respect of the promotion and funding of EST transfer. Further to the UNFCCC Guidelines on reporting, States are required to “distinguish between activities undertaken by the public sector and ... private sector”; “indicate, where feasible, in what way they have encouraged private sector activities”; include “success and failure stories”; specify initiatives to finance “access by developing countries to “hard” or “soft” ESTs; and report information on steps to “support development and enhancement of endogenous capacities and technologies of developing countries”.⁵ Worthy to highlight is the UNFCCC’s expectation that developed States will make deliberate efforts to ‘encourage’ private sector activities in EST transfer.

³ IPCC, *Methodological and Technological Issues in Technology Transfer*, Bert Metz et al, eds. (Cambridge: Cambridge University Press, 2000) 71.

⁴ Asides being leading members of the Organization of Economic Cooperation and Development, the United States, the European Union and Japan, are the leading EST patent holders in the world. See Konstantinos Karachalios, et al, “Patents and Clean Energy: Bridging the Gap between Evidence and Policy” (Final Report) (2010) UNEP, 9.

⁵ *Review of the Implementation of Commitments and of other Provisions of the Convention: UNFCCC Guidelines on Reporting and Review*, UNFCCCOR, 5th Sess, FCCC/CP/1999/7 (2000) (UNFCCC Guidelines), 92.

As will be seen underneath, such facilitation of transfer is virtually non-existent in the national communications considered hereunder, particularly, in respect of African countries.

As noted in chapter two, considering that the global EST industry is considerably dominated, directly or indirectly, by private firms in developed States (and emerging States like China), the public – private connection cannot be overemphasised. This said, for a more robust understanding of the state of EST transfer to Africa, a review of select initiatives by corporate entities and non-governmental organisations will also be done. While the point has been made that the UNFCCC has generally performed a facilitative role in the EST transfer regime, it has in few cases been more directly engaged;⁶ as done through the clean development mechanism (CDM) and the Poznan Strategy.

The above points to three broad EST transfer pathways: UNFCCC initiatives, developed countries' programmes and non-State parties' initiatives. These pathways are, however, not mutually exclusive. For instance, while the UNFCCC, through the GEF, participates directly in the implementation of transfer projects under Poznan, it also serves as an 'implementation platform' for States and non-state entities. Outside the UNFCCC's implementation platforms (CDM and Poznan), however, States and non-state entities initiate and implement stand-alone transfer programmes. Here, Kyoto and Poznan are deemed 'UNFCCC' oriented pathways because, unlike other State or non-State initiated projects, initiatives thereunder are controlled and/or regulated by UNFCCC rules and terms of engagement.

In considering each of these pathways, the actual result of the transfer programmes, at the recipient-level, must, necessarily, be considered. The paucity of scholarly works on transfer at the recipient-level is, however, not without justification. One is the absence of data in most developing countries, particularly, African States, on the actual effect of transfer initiatives on mitigating climate change, aiding adaptation or fostering sustainable development. Another possible justification is that there are diverse reasons for the effectiveness or, otherwise, of a transfer initiative in a developing State which are unconnected to the initiative itself.⁷ These justifications notwithstanding, an on-the-ground

⁶ Facilitation has been described to connote "both direct interventions to match supply and demand, transfer specific technologies, and indirect, broader policy interventions aimed at improving enabling environment for science, technology and innovation (STI)". See Wei Liu, et al, "An Overview of the UN Technology Initiatives" (2015) United Nations Inter-Agency Working Group on a Technology Facilitation Mechanism Background Paper No. 2015/1, 2.

⁷ Damilola Olawuyi listed some of these conditions to include: inadequate public information; weak legal protection for imported technologies; lack of technical and institutional capacity; weak investment environment for clean technology entrepreneurship; and lack or inadequacy of climate change laws. See Damilola S Olawuyi, "From technology transfer to technology absorption: addressing climate technology gaps in Africa" (2017) 0:0 J Energy Nat Resour Law 1, online: <<https://www.tandfonline.com/doi/full/10.1080/02646811.2017.1379667>> 11 - 21.

appreciation of the impacts of claimed transfer initiatives is vital. A possible way of making such an assessment is through technology needs assessment (TNA), technology action plans (TAP) and Project Ideas submitted by developing States to the UNFCCC. As noted in chapter two, a common feature in the phases of the UNFCCC EST transfer regime is the emphasis on State-led TNAs in developing States.

TNAs and TAPs, potentially, provide a glimpse into the appropriateness and effectiveness of donors' initiatives and approaches. Although not conclusive, the recurrence of similar needs in different TNAs over a period of time, could potentially give a hint of the effectiveness or validity of projects. This approach is, however, riddled with several limitations. One, the UNFCCC TT:CLEAR database only has few TNAs and TAPs submitted by African States. Two, only few African countries have TNAs, TAPs and project ideas, and fewer States submitted such documents more than once. Three, a considerable number of the documents are written in French, without an English translation. These limitations constrain the scope of the comparative work sought to be done in this research to three African States: Ghana, Kenya and Mauritius. However, apart from representing different sub-regions of the continent (West, East, and South-East Africa), the select countries have diverse mitigation and adaptation needs which relatively mirror situations in other African countries.⁸ Again, Mauritius' status as a small island state gives a perspective into the unique challenges of such countries.

Having identified the EST transfer pathways and instruments that will be analysed here, it is necessary to be clear about the indicators of performance. In other words, what do we look for to conclude that a pathway or an instrument of transfer was/is effective? It is to this I now turn.

3.2 Developing an Assessment Rubric: Performance Indicators for the EST Transfer Regime

In establishing a body of appraisal criteria for EST transfer, it is worth emphasizing that there are two broad levels on which transfer can be assessed: the 'source' and the 'recipient'.⁹ A wholly effective regime entails competencies at both levels of the transfer construct. The 'what', 'when', 'where',

⁸ For the reasons earlier stated, no North African State has been selected. Particularly, the few TNAs that exist are rendered in French, while most of them are only for a year. To compare the recurrence of needs over a period of time, it is necessary to have more than one TNA for the analysis sought to be done in this chapter. Given the closeness of Kenya to the northern part of the continent, it is expected that some of its conditions and assessments, will apply to northern States.

⁹ Although 'the source' in climate change discourse is generally framed as 'developed States', it is used more generally in this chapter as an umbrella term for the different entities in EST transfer. These include developed States, corporate and non-governmental organizations and, even, developing States with 'transferrable' technologies (including traditional knowledge). The term 'recipient' is however more limited to State entities, specifically developing States. This however does not mean that developed States are ineligible to be 'recipients'. Again, often, corporate entities are direct recipients of technologies through investment. This chapter, however, only focuses on developing States at the 'recipient' level.

‘how’ and ‘why’ of technologies transferred at the ‘source’ level, will of necessity impact how it is received at the ‘recipient’ level.¹⁰ Vice versa, conditions at the ‘recipient’ level can determine how effective a transferred technology will be. While both levels affect each other, they have different measures of appraisal.¹¹ It is, however, contended that the position of developed States that source-level effectiveness is mainly incumbent on recipient-level competences is only ‘half-the-truth’. While the performance of a transfer initiative is, no doubt affected by the local context it is to operate in; there is a first-level expectation that such a policy be properly designed from start. Primarily, it behoves ‘transfer sources’ to ensure ‘innate effectiveness’ of transfer programmes both at the design and implementation phases.¹² It is after complying with this, that local conditions at the recipient level can be referenced as ‘barriers’. In this sense, such barriers cannot strictly be considered as ‘barriers to transfer’, but ‘barriers to (internal) dissemination’.¹³

This work focuses on the appraisal of ‘source’ level transfer. The key question sought to be answered in this section is: how do we determine that a ‘source’ level transfer initiative or programme is effective? As already established in chapter two, transfer initiatives by developed states are motivated by a capacity-based conception of ‘obligation’. Hence, as shown later ‘donor’ States determine the ‘recipient’, the parameters of the project and the mode of execution. The determination of a transfer initiatives’ success is, therefore, often based on the perception of the source-state. This, again, makes the development of ‘recipient-sensitive’ (assessment) metrics necessary. Few attempts have been

¹⁰ In his seminal work on ‘Diffusion of Innovations’, Everett Rogers identified four elements in the diffusion of innovations: an innovation (what); channel of communication (how); period (time) of communication (when); and a social system (where). The ‘why’ of diffusion, also, features under Everett’s thoughts on ‘innovation decisions’. See Everett Rogers, *Diffusion of Innovations*, 5th edn (New York; Free Press, 2003) 11 – 35. Everett’s work is however more suited to ‘recipient’ level analysis of diffusion (used as a broad term to cover transfer and dissemination of technology). But some his thoughts are adaptable to source level analysis, as will be attempted here.

¹¹ Samuel Bar-Zakay classifying the transfer process into four stages (search; adaptation; implementation and maintenance) distinguished between ‘source’ and ‘recipient’ transfer requirements/responsibilities in each of the stages. See generally Samuel, Bar-Zakay, “Technology Transfer Model” (1970) online: <<https://www.rand.org/pubs/papers/P4509.html#download>>

¹² ‘Innate effectiveness’, as used here, means the capacity of a transfer initiative to optimally perform by meeting standards unconnected to external variables, like local conditions at the recipient level.

¹³ K, Ramanathan, “An Overview of Technology Transfer and Technology Transfer Models” online: <http://tto.boun.edu.tr/files/1383812118_An%20overview%20of%20TT%20and%20TT%20Models.pdf> 5

made to set the metrics with which an EST, in the context of transfer, can be measured.¹⁴ The IPCC, in a 1996 study, provided the following as criteria for the evaluation of ‘technologies and measures’:¹⁵

1. GHG and Other Environmental Considerations

- GHG reduction potential: Tons of carbon equivalent; per cent of IS92a baseline and range (IS92c-e).
- Other environmental considerations: Percentage change in emissions of other gases/particulates; Biodiversity, soil conservation, watershed management, indoor air quality, etc.

2. Economic and Social Considerations

- Cost-effectiveness: Average and marginal costs.
- Project-level considerations: Capital and operating costs, opportunity costs, incremental costs.
- Macro-economic considerations: GDP, jobs created or lost, effects on inflation or interest rates, implications for long-term development, foreign exchange and trade, other economic benefits or drawbacks.
- Equity considerations: Differential impacts on countries, income groups or future generations.

3. Administrative, Institutional and Political Considerations

- Administrative burden: Institutional capabilities to undertake necessary information collection, monitoring, enforcement, permitting, etc.
- Political considerations: Capacity to pass through political and bureaucratic processes and sustain political support; Consistency with other public policies.
- Replicability: Adaptability to different geographical and socio-economic-cultural settings.

The above criteria, however, pertain more to the assessment of technologies *per se*, and not technology transfer initiatives. The conditions, as well, entail a fusion of requirements at both the source and recipient ends without making distinctions between both. While similar conditions might apply at both levels, some are more ‘level-sensitive’. For example, although ‘GHG and other environmental considerations’ apply more at the ‘source’ level, ‘administrative, institutional and political considerations’ are more relevant at the ‘recipient’ level. In a later study, the IPCC adapted the above criteria as metrics to appraise technology transfer, although it appears to (erroneously) use the terms ‘technology transfer’ and ‘technologies that are transferred’ synonymously.¹⁶ The more recent report however included ‘process related criteria’, entailing:¹⁷

¹⁴ The UNFCCC identified *cost effectiveness, environmental sustainability, cultural compatibility and social acceptability* as key EST policy criteria. See UNFCCC, *Technologies for Adaptation to Climate Change*, (UNFCCC; Bonn, 2006) 11. See also Agenda 21, para. 4.3, which states that ESTs “should be compatible with nationally determined socio-economic, cultural and environmental priorities”.

¹⁵ Robert T Watson, Marufu C Zinyowera & Richard H Moss, *TECHNOLOGIES, POLICIES AND MEASURES FOR MITIGATING CLIMATE CHANGE: IPCC Technical Paper I* (IPCC, 1996) 11.

¹⁶ IPCC, *supra* note 3 at 64 – 65, 180

¹⁷ *Ibid* at 65, 180.

- 1. Market penetration:** Rate of indigenisation; geographic extent of penetration and impacts on other technologies and ancillary benefits.
- 2. Long term institutional capacity building:** flexibility and capacity to adapt technology to changing circumstances and to sell back to original provider with improvements; capacity of local staff and long-term financing; improvements in training and management practices.
- 3. Monitoring and evaluation of continuous delivery of services provided by technology and adequate financial performance:** continuous delivery of services provided by technology; comparison of actual and intended benefits; performance of technology; quality of benefits; satisfaction of beneficiaries; distribution of benefits (equity); maintenance and service of equipment; adequate financial performance; payback period; financial rate of return; net present value.

Arguably, the ‘process related criteria’ are more tailored as ‘technology transfer’ criteria than the more generic technology-based criteria established in the IPCC’s 1996 criteria. The ‘process related criteria’ are, however, ‘recipient’ focused, and provides little aid for the assessment of source-level transfer. This inadequacy necessitates the (re)-construction of metrics for a source level analysis, which will necessarily draw from the above IPCC criteria. Developing such criteria also entails a re-consideration of the ‘original’ agreements on technology transfer, particularly, Article 4(5) of the UNFCCC and Chapter 34 of Agenda 21. Article 4(5) mandates that developed States take “...all practicable steps ... as appropriate” in respect of EST transfer to enable developing States to “implement the provisions of the Convention”. Whereas the phrase “...all practicable steps ... as appropriate” is very nebulous, it is clear that such ‘steps’ must enable developing States to meet their commitments under Article 4(1)(a) – (j).¹⁸ The commitments contained in Article 4(1) can be classified into three: duty to report; duty to cooperate and duty to develop sustainably.¹⁹ A joint reading of Article 4(5) and 4(1) informs the conclusion that EST transfer ‘steps’ must ultimately aim to enable recipient States to develop the capacity to *report, cooperate and develop sustainably*. It is, therefore, arguable that the overarching criterion of a transfer initiative is whether it is ‘enabling’. An emphasis on ‘enablement’ as proposed has diverse implications. For one, it substantially shifts the focus from stand-alone ‘hardware transfer’ initiatives, to wholesome projects with emphasis on the software and orgware components of such transferred technology. Again, an ‘enablement’ driven transfer construct will potentially drive to the

¹⁸ Commitments under Article 4(1)(a) – (j) of the UNFCCC applies to “all parties” under the climate regime. Hence, developing States, are *inter alia*, obligated to “promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs”; “take climate change considerations into account ... in their relevant social, economic and environmental policies and actions ...” etc.

¹⁹ Duty to report – Article 4(1)(a)(b)(j); Duty to cooperate – Article 4(1)(c)(e)(g)(h)(i); Duty to develop sustainably – Article 4(1)(d)(f).

surface the imperatives of vertical transfer of ESTs as against the more prominent horizontal transfer.²⁰ Importantly, ‘enablement’ as the primary criterion of transfer will, invariably, facilitate developing States’ transition from ‘recipients’ to ‘contributors’, as evidently anticipated in Art. 4(1).

‘Enablement’, as the motherlode of EST transfer policy, is reaffirmed in chapter 34 of Agenda 21. It, for instance, affirms that “the primary goal of improved access to technology information is to enable informed choices, leading to access to and transfer of such technologies and the strengthening of countries’ own technological capabilities”.²¹ A close reading of chapter 34 further provides the sub-components of the ‘enablement criterion’. These can be summarised as accessibility and sustainability²². This much can be gleaned from paragraph 34.14 which emphasises access, transfer of technologies and know-how on favourable terms, promotion of indigenous technologies and support of endogenous capacity building as the objectives of the EST transfer regime. In summary, ‘accessibility’, as used here, entails availability, affordability and cooperation, while ‘sustainability’ includes compatibility, adaptability and maintenance. Evidently absent from these sub-criteria are environmental effectiveness, administrative and political considerations, and market penetration. It is worth repeating that the sub-criteria above proposed are source-level metrics to appraise EST transfer initiatives. Further, while not exhaustive, they have been developed as a simple and easy-to-apply qualitative appraisal model. The sub-criteria are represented more clearly in the table below.

²⁰ Edwin Mansfield distinguished between vertical and horizontal technology transfer thus: “Vertical technology transfer occurs when information is transmitted from basic research to applied research, from applied research to development, and from development to production. Such transfers occur in both directions, and the form of the information changes as it moves along this dimension. Horizontal transfer of technology occurs when technology used in one place, organisation, or context is transferred and used in another place, organisation, or context”. See Edwin Mansfield, *Technology Transfer, Productivity and Economic Policy* (New York; W.W. Norton & Co., 1982) 28 cited in Bojan Pretnar, “Commercialism of Patents and Know-how: From Academia to Industry” online: < <http://www.uil-sipo.si/uploads/media/Pretnar.pdf>>. An example of this kind of vertical transfer is the university – industry transfer. Vertical transfer will potentially allow for the involvement of developing states at the early stage of EST development. Further, considering the location sensitive nature of ESTs, early involvement via vertical transfer will likely make an EST more adapted to the peculiarities of a recipient.

²¹ Agenda 21, para. 34.8.

²² Sustainability is used here to mean ‘sustainable technology transfer’, which has been described as “Technology transfer that is more than a one-off transfer of equipment, know-how or both to the host developing country but generates indigenous and lasting embedding of this technology in the host country”. See Gary Cox, “The CDM as a Vehicle for Technology Transfer and Sustainable Development” (2010) 6 Law, Environment and Development Journal 179 at 196.

Source-Level EST Transfer Metrics²³

ENABLEMENT			
Accessibility		Sustainability	
<i>Availability</i>	<ul style="list-style-type: none"> • Wholesale availability (hardware + software + orgware). • Assured access.²⁴ • Observability. 	<i>Compatibility</i>	<ul style="list-style-type: none"> • Compatibility of source-initiative and recipient-priorities. • Compatibility with recipient State policies. • Social/cultural compatibility.
<i>Affordability</i>	<ul style="list-style-type: none"> • Favourable, concessional and preferential commercial terms. • Macro-economic considerations (GDP, jobs created or lost, etc). • Equity considerations (distributive/differential impacts). 	<i>Adaptability</i>	<ul style="list-style-type: none"> • Flexibility and non-complexity. • Local technical and managerial capacity development. • Trialability. • Re-invention.
<i>Cooperation</i>	<ul style="list-style-type: none"> • Design to Execution inter-party consultation. • Host-state input and engagement. 	<i>Maintenance</i>	<ul style="list-style-type: none"> • Monitoring. • Evaluation of intended and actual benefits. • Local servicing of equipment. • Regional (international) interconnectivity and partnership.

It is expected that an effective (and equitable) transfer initiative will substantially satisfy the above requirements. What follows is an appraisal of EST transfer initiatives in the light of the foregoing.

3.3 UNFCCC Facilitated EST Transfer Programmes in Africa

The point has been made that rather than engaging in the direct transfer of ESTs, the UNFCCC primarily plays a facilitative role. However, the Clean Development Mechanism (CDM) and the Poznan Strategy are two of the very rare instances where the UNFCCC plays a more direct role in facilitating transfer.

3.3.1 The Clean Development Mechanism

While the 1992 UNFCCC contained broad objectives and provisions on global climate governance, the 1997 Kyoto Protocol stipulated explicit and measurable emission reduction targets and modes of

²³ The metrics are distilled from Chapter 34 of Agenda 21; IPCC metrics (*supra* notes 15 - 17) Bar-Zakay's Technology Transfer Model (*supra* note 11) and Everett Rogers' Diffusion of Innovations (*supra* note 10).

²⁴ Paragraph 34.10 and 34.11 of Agenda 21 referenced the concept of "assured access for developing countries to (ESTs) in its relation to proprietary rights". The 'assured access' concept is more commonly employed in the 'global commons' discourse. (See for example, Mark Barrett et al, *Assured Access to the Global Commons* (Virginia; NATO, 2011)). In that context, it means that all States, particularly developing States, should have unfettered access to ESTs regardless private proprietary right claims.

meeting these targets for annex I countries. To ease the achievement of these targets, the Protocol provided for multiple pathways, generally called ‘flexible mechanisms’ for developed States: Joint Implementation and the Clean Development Mechanism (CDM). The joint implementation provision allows Annex 1 parties to transfer to or acquire from themselves emission reduction units “resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks”.²⁵ This section, however, focuses on the CDM.

Described as “one of the most innovative tools of the Kyoto Protocol”,²⁶ the CDM is a market driven mechanism which facilitates undertaking cost-efficient ‘climate enhancing’ projects in developing countries in exchange for an ‘allowance to emit’ in developed States. As noted elsewhere, the CDM’s rationale is that “the marginal cost of emissions reduction in developing ... countries would be less than for developed ones”.²⁷ The Kyoto Protocol is, however, subtler in its articulation of the objectives of the CDM, highlighting²⁸ instead, the assistance of non-annex I Parties to achieve sustainable development and Annex I parties to achieve compliance with their emission reduction commitments. Understanding that the CDM is primarily an economic device mainly designed as an assistive tool for annex I States is crucial to appreciating its overall workings. It is in this context that the CDM’s sustainable development objective has been described as ‘complementary’.²⁹ Under the CDM, annex I States earn certified emission reductions (CERs) through projects carried out in developing States, with which they can meet their emission reduction commitments. To obtain CERs, however, the project is expected to have involved the voluntary participation of parties, result in “real, measurable, and long-term benefits related to the mitigation of climate change”, and ensure “reductions in emissions that are additional to any that would occur in the absence of the certified project activity” (additionality).³⁰

²⁵ See Kyoto Protocol, art. 6(1).

²⁶ Antoine Dechezlepr et al, “The North-South Transfer of Climate-Friendly Technologies through the Clean Development Mechanism” (2007) October Int Aff., 8. See also Carsten Warnecke, Thomas Day & Noémie Klein, “Analysing the status quo of CDM projects: Status and prospects” (2015) May Ger Fed Minist Environ Nat Conserv Build Nucl Saf 140, online: <<http://newclimate.org/2015/05/16/analysing-the-status-quo-of-cdm-projects/>>.

²⁷ Michael W Wara, “Measuring the Clean Development Mechanism’s Performance and Potential” (2008) 55:6 UCLA Law Rev 1759 at 1763.

²⁸ Kyoto Protocol, art. 12(2).

²⁹ UNFCCC, “The Contribution of the Clean Development Mechanism under the Kyoto Protocol to Technology Transfer” (2010) 10.

³⁰ Kyoto Protocol, art. 12(5).

Although widely represented as a tool for EST transfer,³¹ there is no explicit mention of technology transfer as an incidence of the CDM. Connection has, however, been drawn between the sustainable development objective and the necessity of EST transfer in operationalizing the CDM.³² In fact, developed States, like the United States, recognise the CDM as a vehicle and incentive for the transfer of ESTs.³³ A more direct link between CDM and EST transfer was subsequently established by the COP in 2001 and 2006.³⁴ Outlining the information required in a project design document (PDD) to be submitted by a CDM project proponent, the 2001 and 2006 decisions require “a description of the project comprising the project purpose, a technical description of the project, including how technology will be transferred, if any...”³⁵ While this requirement does not mandate technology transfer, it admonishes the inclusion of information on technology transfer, if such transfer is intended. Although it might be argued that since the CDM was not originally designed as an EST transfer mechanism, source-States, as shown above, consider it as such.

Various studies have been conducted into the performance of CDM as an EST transfer pathway.³⁶ As noted in several of these studies, not all CDM projects involve the transfer of ESTs. A study, for example, found that of the 4984 projects in the CDM pipeline in 2010, 2,262 specifically indicated that there would be no technology transfer, 1,206 PDD had no mention of technology transfer, while 1,516 projects were expected to involve technology transfer.³⁷ Of the 1,516 projects entailing technology transfer, 515 involved the transfer of equipment alone, 209 projects transferred knowledge

³¹ Malte Schneider, Andreas Holzer & Volker H Hoffmann, “Understanding the CDM’s contribution to technology transfer” (2008) 36:8 Energy Policy 2920 at 2936; Heleen De Coninck, Frauke Haake & Nico Van Der Linden, “Technology transfer in the Clean Development Mechanism” (2007) 7:5 Clim Policy 444.

³² UNFCCC, *supra* note 29 at 12.

³³ See SBSTA, 13th Sess., (2000) Development and Transfer of Technologies – Status of the Consultative Process (Submission of Parties) online: <<https://unfccc.int/resource/docs/2000/sbsta/misc04.htm>>

³⁴ Preamble to Decision 17/CP.7 *inter alia* states that “...clean development mechanism project activities should lead to the transfer of environmentally safe and sound technology and know-how in addition to that required under Article 4, paragraph 5, of the Convention...” See *Modalities and Procedures for a Clean Development Mechanism as defined in Article 12 of the Kyoto Protocol*, Decision 17/CP.7, UNFCCCOR, FCCC/CP/2001/13/Add.2.

³⁵ See *Ibid*, Appendix B, para.1a; *Modalities and Procedures for a Clean Development Mechanism as defined in Article 12 of the Kyoto Protocol*, Decision 3/CMP.1, UNFCCCOR, FCCC/KP/CMP/2005/8/Add.1, Appendix B, para. 2(a).

³⁶ P Karani, “Technology transfer to Africa-Constraints for CDM operations” (2002) 3:3 Refocus 20; Schneider, Holzer & Hoffmann, *supra* note 32; Wytze van der Gaast, Katherine Begg & Alexandros Flamos, “Promoting sustainable energy technology transfers to developing countries through the CDM” (2009) 86:2 Appl Energy 230; Dechezlepr et al, *supra* note 26; UNFCCC, *supra* note 29; Ana Pueyo & Pedro Linares, *Renewable Technology Transfer to Developing Countries : One Size Does Not Fit All* (2012); A REISMAN & Stephen Seres, “Analysis of Technology Transfer in CDM Projects: Report for the UNFCCC Registration & Issuance Unit CDM/SDM” (2007) 33:December Omega 189, online: <<http://www.scopus.com/inward/record.url?eid=2-s2.0-11144350508&partnerID=tZOtx3y1>>.

³⁷ UNFCCC, *supra* note 29 at 16.

only, and 792 projects entailed transfer of equipment and knowledge.³⁸ A similar trend is recorded for studies conducted at other periods.³⁹ Other similar findings in these studies are that: transfer is more likely in larger projects, unlike unilateral and small-scale projects;⁴⁰ the frequency of transfer decreases as the projects of the same type are repeated in the host countries; and projects bordering on energy efficiency, HFCs, N₂O, transportation and wind are more likely to involve technology transfer.⁴¹ Although a considerable number of projects are said to entail the transfer of equipment and knowledge, the knowledge said to be transferred primarily deal with operation and maintenance, as against actual capacity building to re-invent and produce technologies.⁴²

Unlike Asian and Latin American countries, Africa has considerably few CDM projects, with most of existing projects concentrated in South Africa.⁴³ For example, of the 8366 projects in the CDM pipeline as of May 2018, only 242 (2.9%) are located in Africa.⁴⁴ Reasons for the paucity of projects range from the disincentivizing business environment to the absence of institutional capacity.⁴⁵ Olawuyi⁴⁶ notes that due to their high emissions, countries like China, India and South Africa boast of large CDM projects.⁴⁷ Apart from the paucity of African CDM projects, is their unsustainability. Warnecke et al.⁴⁸ found in 2015 that only 46% percent of projects have been fully implemented, while only 29% of surveyed African projects were in regular operation.⁴⁹ These Africa-centric studies, however, focus generally on the performance of CDM on the continent, with ancillary reference to

³⁸ *Ibid.*

³⁹ See Dechezlepretre, *supra* note 26 and Schneider et al, *supra* note 31;

⁴⁰ *Ibid.*

⁴¹ UNFCCC, *supra* note 29 at 18.

⁴² Nicolas Kreibich et al, “An update on the Clean Development Mechanism in Africa in times of market crisis” (2017) 9:2 *Clim Dev* 178 at 188.

⁴³ *Ibid* at 178.

⁴⁴ UNEP DTU Partnership, Centre on Energy, Climate and Sustainable Development, “CDM Projects by Host Region” online: <<http://cdmpipeline.org/cdm-projects-region.htm#1>>

⁴⁵ *Ibid*; See also Damilola S Olawuyi, “Achieving Sustainable Development in Africa through the Clean Development Mechanism: Legal and Institutional Issues Considered” (2009) 17:2 *African J Int Comp Law* 270 at , online: <<http://www.eupublishing.com/doi/abs/10.3366/E0954889009000401>>.

⁴⁶ Olawuyi, *supra* note 45 at 284.

⁴⁷ About 70% of CDM projects are said to be concentrated in China and India. As noted elsewhere, for a project to be deemed cost effective, it should deliver at least 100,000 CERs per year, and only countries generating about 10,000 – 20,000 metric tons of CO₂ are presumed attractive. See Axel Michaelowa & Frank Jotzo, “Transaction costs, institutional rigidities and the size of the clean development mechanism” (2005) 33:4 *Energy Policy* 511.

⁴⁸ Warnecke, Day & Klein, *supra* note 26 at 44.

⁴⁹ Kreibich et al, *supra* note 42 at 182.

the impact on technology transfer to a recipient country. Through a quick review of select PDDs submitted by proponents and data on the UNEP DTU platform, an attempt will be made to appraise the trend of CDM projects in Africa and their EST transfer implications. The CDM spreadsheet shows about 236 CDM projects executed (or being executed) in Africa.⁵⁰ Although a comprehensive assessment of the projects is not possible here, a sample review of registered CDM projects in Nigeria, Kenya, South Africa and Morocco might provide some indicators as to how effective CDM has been as a tool of transfer.⁵¹

As of May 2018, Nigeria had seven registered CDM projects.⁵² With the exception of the Asuokpu/Umuti gas recovery project, six of the projects made reference to technology transfer. The commitments made were, however, generally couched without reference to particular steps to ensure transfer. The Kwale gas recovery PDD, for instance, referred to “technology transfer and improvement of local know-how, through the adoption of a reliable state of the art gas engineering technology”.⁵³ The efficient fuel wood stoves project provides more details on its transfer component. The project entails the SAVE80 system, a firewood efficient stove pre-fabricated in Germany, but shipped to Nigeria for assemblage.⁵⁴ The proponent noted its intention to produce the system locally, once there is a ‘reasonable’ Nigerian market.⁵⁵ While 5,500 stoves were originally sold at reduced price to

⁵⁰ *Supra* note 44.

⁵¹ To maintain a manageable scope, the analysis focuses on registered projects and not all projects in the CDM pipeline. Pipeline projects include both registered and projects in the process of being validated by the Designated operational entities (DOEs).

⁵² Associated gas recovery process at Kwale oil-gas processing plant; efficient fuel wood stoves for Nigeria; recovery and marketing of gas that would otherwise be flared at the Asuokpu/Umuti Marginal Field; LFG Project in Nigeria; Lafarge WAPCO partial substitution of alternative fuels in cement facilities project in Nigeria; recovery and utilization of associated gas from the Obodugwa and neighbouring oil fields in Nigeria; and Kainji Hydropower rehabilitation project. See <<https://cdm.unfccc.int/Projects/projsearch.html>>. It is, however, worth noting that the projects are dominated by gas (flaring) recovery projects. Given that the Nigerian Associated Gas Re-injection Act, CAP A25 LFN 2004, s. 3, prohibits the flaring of gas in the country, it is doubtful if the projects would have met the condition of additionality, since the law already compels the non-flaring of gas. Expectedly therefore, without the projects, oil and gas companies are mandated to do the same thing the project supposedly facilitate(d).

⁵³ CDM-PDD, online:

<https://cdm.unfccc.int/filestorage/T/2/N/T2N9G73GCSUW91EJUE7BJRW9NGIOLU/Final%20PDD-Nigeria%20_03_08_06.pdf?t=ZW18cDlrczI4fDBY_RNGHjM1sGG7-BDb40Rk>

⁵⁴ CDM-PDD, online:

<https://cdm.unfccc.int/filestorage/l/z/23VFX68ADZ9LMN1RU4WPEIOSYGB5H7.pdf/130218_Nigeria_PDD_form02_v03_PRC_clean.pdf?t=cGZ8cDlrczNvfDCDZ4BK_LnO1aRahYEBZWq6>

⁵⁵ *Ibid.*

users,⁵⁶ the high purchase price of the stove⁵⁷ and the absence of local manufacturing capacity are few of the challenges which have stifled the project. The SAVE 80 system example provides a window into the operation of CDM projects in Nigeria. Worth highlighting is the capacity building dimension of the transfer design of these projects. While 12,500 stoves were projected to be distributed between 2009 and 2015, only 3000 stoves were distributed, due to “custom hitches”.⁵⁸ However, if manufactured in-country, ‘custom hitches’ would not have been a challenge. It is apparent that an assemblage, maintenance or operational ‘capacity’ transfer⁵⁹ is insufficient to foster actual technology transfer. While it is difficult to appraise the projects using the earlier designed metrics, it can be safely concluded that they do not satisfy the requirements of availability, affordability and adaptability.

Kenya presently has nine registered CDM projects.⁶⁰ While two of the projects explicitly stated that there will be no technology transfer,⁶¹ one project made a tangential reference to the transfer of skills, but transfer was more directly provided in six projects. Like it was in the Nigerian example, the six CDM projects with explicit transfer provisions provided for both hardware transfer and capacity development. Howbeit, the capacity development in view pertained to the operational and maintenance training of personnel.⁶² While there is no available data to consider how these projects

⁵⁶ “The Stove 80 woodstove and wonder box” online: <<http://www.unepfi.org/fileadmin/events/2011/lagos/Save80CDMProjectPart2.pdf>>.

⁵⁷ The price of the stove, stainless steel pot and wonderbox is put at about €85 (about N35,000 (Nigerian Naira)). This is about double the country’s monthly minimum wage (N18,000). See Paul Kramer, “A Highly Efficient Fuel Wood Stove – The Save 80 in Kaduna, Nigeria” online: <www.1-h-l.org/?download=highly_efficient_%20stove_Save80.pdf>.

⁵⁸ The Partnership for Clean Indoor Air, “The save 80 Efficient Fuelwood Stove for Nigeria”, online: <<http://www.pciaonline.org/projects/save-80-efficient-fuelwood-stove-nigeria>>

⁵⁹ Another example is the Obodugwa gas recovery and utilization project, which noted that while the compression equipment will be built in the USA, Nigerian engineers will be trained in the “installation, operation and maintenance of this equipment”. See F-CDM-PDD, online: <<https://cdm.unfccc.int/filestorage/o/q/LTE4YOD03G6N5CX8HRZUA9SKJP2VMB.pdf/P%20081112%20Final%20Obodugwa%20PDD%20public%20vers.pdf?t=aDN8cDlrczV0fDA7KGIwt8H3E0gZicDMTnEt>>

⁶⁰ The projects are made up of five reforestation projects, and four geothermal, biofuel, energy efficiency and wind electricity generation projects. See <<https://cdm.unfccc.int/Projects/projsearch.html>>.

⁶¹ Both projects were on the reforestation of Aberdare forest complex and MAU forest complex. The unilateral nature of the project (as it was internally financed by the Kenyan Ministry of Finance) could account for the absence of transfer, as transfer is in this context deemed inter-state.

⁶² For example, the 5.1MW Grid connected wind electricity generation at Ngong Hills, Kenya, which stated in its PDD that “know how transfer is provided by training local personnel to operate the turbines”. See <https://cdm.unfccc.int/filestorage/F/6/0/F605JS3OBCM4TL9QWENA8DGI1PZUX2/Ngong_I_05_03_2014.pdf?t=OUd8cDlsYWRvfDBHCDaTWN2cXYAvaAFkcuNW>. Also see the Karan Biofuel CDM project, which provided in its PDD that “State-of-the art Indian technology has been ordered as new and imported together with dedicated knowhow for commissioning and maintenance”. See <<https://cdm.unfccc.int/filestorage/x/u/XWRFESV1D0G6B8YZ7POL4HMIN29Q35.pdf/PDD.pdf?t=Y0R8cDlsYWVkfDBfPsMJFo1BDzL9-cL9tfy8>>.

satisfy the various metrics of effective transfer initiatives, it can reasonably be contended that the condition of adaptability is unmet. The Olkaria III Phase 2 Geothermal Expansion Project, perhaps, indicates this point. While the project has been lauded as a success and an example to other African countries,⁶³ its transfer impact has received less applause. The project is operated by Orpower 4, Inc, a Kenyan subsidiary of an American company, Ormat, which began the first phase of the project in the late 1990s.⁶⁴ Although it has been suggested that the project has resulted in “technology transfer from Ormat to its counterparts”, a recent paper in respect of Olkaria IV, operated by Kenya Electricity Generating Company Limited (KenGen) found otherwise.⁶⁵ It noted that Olkaria IV’s challenges include:

Poor knowledge by the client. The client lacks the expertise to carry out design and installation of the power plant and have to rely on the consultant and the EPC contractor. Knowledge transfer was inadequate, and this therefore means that the client is still inadequately staffed.⁶⁶

Twelve of the twenty-two CDM projects registered for South Africa involved foreign partners.⁶⁷ Only one project, however, failed to provide for technology transfer.⁶⁸ Interestingly, a majority of the CDM projects entailed only transfer of technologies (hard ware) without more.⁶⁹ In contrast, the Dassieklip

⁶³ See Valerio Micale, Chiara Trabacchi & Leonardo Boni, “Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya” (2015) Climate Policy Initiative, online: <http://climatepolicyinitiative.org/wp-content/uploads/2015/06/150601_Final_Olkaria_ForWeb.pdf>

⁶⁴ The project uses Ormat designed and owned organic rankine-cycle turbines (also called Ormat Energy Converter (OEC)).

⁶⁵ Pharis Mukeu & Reuben Langat, “Olkaria (Kenya) Geothermal Project Case Study” (2016) 40 GRC Transactions 85.

⁶⁶ *Ibid* at 88.

⁶⁷ <<https://cdm.unfccc.int/filestorage/Q/4/K/Q4K589JXEA6SUZYBHDVMPN2O1FL3T7/Final%20PDD.pdf?t=QnN8cDlseXhzfDCQmeua04NwYHL5mcZcu3ud>>

⁶⁸ The inclusion of technology transfer in all but one of the PDDs might be connected the express requirement for ‘appropriate technology transfer’ for the South African DNA project approval process. See, “The South African DNA Project Approval Process” online: < <http://www.energy.gov.za/files/esources/kyoto/dnaapproval.pdf> >. Only the ‘Capture and Utilization of Methane at the Sibanye Gold owned Beatrix Mine in South Africa’ failed to provide for technology transfer. See <https://cdm.unfccc.int/filestorage/V/I/8/VI8FSDOYEMJ4KZNB3L6CH52W0A7GQR/2017-07-13%20Beatrix%20Updated%20PDD_Clean.pdf?t=WHP8cDlseTNufDAI3WiwEEVSNliyxQqmKd4>

⁶⁹ See, “Manufacture and Utilization of Bio-coal Briquettes in Stutterheim, South Africa” online: <<https://cdm.unfccc.int/filestorage/Q/4/K/Q4K589JXEA6SUZYBHDVMPN2O1FL3T7/Final%20PDD.pdf?t=QnN8cDlseXhzfDCQmeua04NwYHL5mcZcu3ud>>; North west, KwaZulu-Natal & Eastern Cape CFL Replacement Project, online: < https://cdm.unfccc.int/filestorage/v/m/LKNG357QMSJYE1DXU9T0V4F8PBCAZ6.pdf/7356-PDD_%2011Dec2012.pdf?t=ZTN8cDlseTM1fDBz44g5Y880W8-DSBsB4yNX >; Gauteng, Free State, Mpumalanga, Limpopo & Northern Cape CFL Replacement Project (1) in South Africa, online: < https://cdm.unfccc.int/filestorage/k/w/DAHR6T07C5LQGFU83SMWIXJN4YE9P2.pdf/7478%20PDD%20%2027%20Sep%2012.pdf?t=YmN8cDlseTNpfDAeLz_kUMYtPPf7xyKF5_mv> and “Ekurhuleni Landfill Gas Recovery Project – South Africa” online: < <https://cdm.unfccc.int/filestorage/B/I/1/BI1J2FD6T0PKNW7RLX5HOQGSZAEM8V/EMM%20Revised%20PDD%2020140814.pdf?t=a1Z8cDlseTN1fDCjHKz4JtuZpmZUDL0W1gxg> >.

wind energy project emphasised “the transfer of skills and (building of) local capacity” rather than hardware transfer.⁷⁰ The Bokpoort concentrating solar power (CSP) project, however, broke the trend of mere transfer of operational and/or maintenance knowledge by providing that “construction and operational know-how will be transferred to South Africa through the close working relationship within (the) consortium (three Spanish CSP firms and a South African company) and the experience gained by local component manufacturers and suppliers”.⁷¹ While the provision for construction level capacity building in Bokpoort’s PDD is laudable, there is little indication that such transfer occurred at the level of implementation. Although not conclusive, the domination of post-Bokpoort CSP projects by foreign companies as EPC (engineering, procurement and construction) contractors, suggests otherwise.⁷²

Egypt has seven registered CDM projects, six of which are in partnership with annex I countries. The PDDs in respect of Moroccan CDM projects only contain barebone provisions on technology transfer. While one of the projects made no reference to transfer,⁷³ two of the projects simply referred to the ‘introduction of modern technology in the country’ without specifying whether this means hardware, software or both.⁷⁴ Consistent with the trend on capacity development, three PDDs referred to training

⁷⁰ See Dassiikip Wind Energy Facility in South Africa, online: <<https://cdm.unfccc.int/filestorage/y/9/5BTD39216KFPGLGAMQO7JZ4YIXCWHR.pdf/8107-PDD-2012%2011%2009.pdf?t=TXh8cDlseTM5fDDfKxVuUkYqPvsvRHpOrflf>>.

⁷¹ Bokpoort CSP (Concentrating Solar Power) Project, South Africa, online: <https://cdm.unfccc.int/filestorage/8/T/X/8TXDP40YBUWE5RKOJCF2LI16MV3NH9/PA7841_Revised%20PDD_clean.pdf?t=R118cDlseTNlfDAayJEMoyDU4ld65NsTyQA9>

⁷² According to the National Renewable Energy Laboratory (NREL), six CSP projects have been (or are being) undertaken post-Bokpoort - Ilanga I, Kathu Solar Park, KaXu Solar One, Khi Solar One, Redstone Solar Thermal Power Plant and Xina Solar One. The projects have been constructed primarily by Spanish companies like Sener, Acciona, TSK and Abener-Teyma See NREL, “Concentrating Solar Power Projects in South Africa” online: <https://www.nrel.gov/csp/solarpaces/by_country_detail.cfm/country=ZA>

⁷³ Gas Flare Recovery at Suez Oil Processing Company, Egypt, online: <https://cdm.unfccc.int/filestorage/6/g/O9ZBX6LFAPYWQ2I1GN30VJ8ETU75KH.pdf/PDD_ver04.pdf?t=N0t8cDltN2NvfDAgqlqWUryFEGB90XZm-Tht>

⁷⁴ See N2O and NOX Abatement Project at KIMA Fertilizer Plant in Aswan (Egypt), online: <<https://cdm.unfccc.int/filestorage/x/k/C82OWMZGI361NLARBE0XK45JDYQHVP.pdf/8668%20PDD.pdf?t=Tm98cDltN2NhfDDdeRsa9o6x-GP-zjQKYJ2x>> and N2O and NOX Abatement Project at Delta ASMEDA Fertilizer Plant in Al Mansoura (Egypt), online: <<https://cdm.unfccc.int/filestorage/w/4/PLBNSXO9Q57DI4Y0K8E613CJRHWFM2.pdf/9032%20PDD.pdf?t=NU58cDltN2NnfDBLSASiu23GAViYN9BnbdHg>>

for “operation and maintenance purposes”.⁷⁵ Worth highlighting is the Zarana 8 – wind power plant project which indicated that since it is “common practice to carry out assembly in the general vicinity of the actual plant site ... Zafarana 8 will thus also be a real and significant transfer of technology”.⁷⁶

The above survey of the technology transfer dimensions of CDM projects in some of Africa’s most developed and populated countries cannot be said to be representative. Even so, it provides some evidence for previously made anecdotal assertions. The survey offers the following insights:

- i. Technology transfer is, at best, ancillary to CDM. Thus, it is not a priority for project proponents in the design and/or execution of projects.
- ii. Technology transfer is not consistent with the economic framing of CDM. Companies engage in CDM primarily to obtain CERs and to make profit. A transfer of technology, particularly, (actual) capacity is a potential limiter to profit making.
- iii. Most projects surveyed referred to technology transfer and, to some extent, capacity development. But capacity building is generally in the context of operations and /or maintenance, and rarely in terms of ground-up manufacturing and/or construction.
- iv. Claimed technology transfers in PDDs are generally inconsistent with evidence on the ground, as African countries remain dependent on Annex I countries (companies) several years after projects with claimed ‘technology transfer’ are completed and handed over.
- v. Except for unilateral CDM projects, it is doubtful if projects initiated by multi-national companies align with host State priorities (needs). For example, projects on fugitive gas dominate the Nigerian CDM scape. While gas flaring is certainly a problem in the country, it is not as compelling as the country’s chronic energy poverty.
- vi. Except for the maintenance metric, the technology transfer components of surveyed CDM projects failed to meet the ‘enablement’ metrics listed above.
- vii. CDM focused on the transfer of mitigation technologies.⁷⁷

3.3.2 The Poznan Strategy

The Poznan Strategy (Poznan) was the Global Environment Facility’s (GEF) response to the COP’s request that, as the operational entity of the UNFCCC financial mechanism, it consults with interested parties and institutions to “elaborate a strategic programme to scale up the level of investment for

⁷⁵ See Reduction of N2O emissions from the new nitric acid plant of Egypt Hydrocarbon Corporation at Ain Sokhna, online: <<https://cdm.unfccc.int/filestorage/i/u/051G36BO298SLMZNTDFQVWRJUCHY7K.pdf/7606-PDD-5%20Oct%2012.pdf?t=VIB8cDltN2M0fDAIYJ2NH4KnHMNQkR1jcz7S>>; Zafarana KfW IV Wind Farm Project, Arab Republic of Egypt, online: <https://cdm.unfccc.int/filestorage/Q/D/K/QDKWB96Z13XIGJ4V7MLCN5YRH8FASU/PDD_Zafarana%20KfW%20IV%20Wind%20Farm%20Project_Ver.02.1_clean?t=U018cDltN2JyfDDGany_8VsTjlGEh2pIGJxu>; Zafarana 8 – Wind Power Plant Project, Arab Republic of Egypt, online: <<https://cdm.unfccc.int/filestorage/n/v/04TRBEU1HCZIJA27N9O6YMVXKPQSD.pdf/Revised%20PDD%20ver8%20-Clean.pdf?t=eEZ8cDltN2J5fDDbg94vsPhz8kcHqhxIfMal>>

⁷⁶ See, Zafana 8, *Ibid*.

⁷⁷ The Kyoto Protocol, however, provides that “...a share of the proceeds from certified project activities is used to ... assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation”

technology transfer to help developing countries address their needs for (ESTs)”.⁷⁸ As noted in chapter 2, this mandate informed the GEF’s long term implementation strategy.⁷⁹ The point has also been previously made that while technology needs assessment (TNAs) constitutes a crucial preparatory phase to effective technology transfer, it does not constitute technology transfer in itself. Hence, in appraising Poznan, emphasis will be placed on piloted priority technology projects in Africa. Under Poznan the GEF records three projects undertaken in Africa: the solar refrigeration project in Kenya and Swaziland (solarchill); municipal solid wastes composting unit in Cote d’Ivoire; and thermal insulation material production in Senegal.⁸⁰

Solarchill was conceived by a coalition of multilateral and non-governmental organisations in 2001.⁸¹ This was in response to the need for an environment friendly vaccine (and food) solar powered refrigerator, with hydrocarbon-based compressor. Prior to Solarchill, vaccine refrigerators were kerosene or propane operated, with their consequent inefficiency, high cost of procurement and adverse environmental impact.⁸² Again, the vaccine refrigerators made use of hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs) as refrigerant and blowing agents, respectively.⁸³ According to the project’s Project Identification Form (PIF), the project was designed to: determine technical performance and potential market demand for SolarChill technology; support the modification and optimization of the technology; attract potential manufacturers; and support governments in countries with production capacity.⁸⁴

Given that SolarChill is, largely, an open sourced technology and local adaptation was a central component of the project design, Swazi owned and staffed company, Palfridge, has been an active

⁷⁸ *Development and Transfer of Technologies under the Subsidiary Body for Implementation*, Decision 4/CP.13, UNFCCCOR, 2007, FCCC/CP/2007/6/Add. 1, 3.

⁷⁹ The long-term plan entails, support for climate technology centres and a climate technology network; piloting priority technology projects to foster innovation and investments; public-private partnerships (PPPs) for technology transfer and GEF as a catalytic supporting institution for technology transfer. See Chizuru Aoki, et al, *Implementing the Poznan Strategic and Long-Term Programs on Technology Transfer*, (GEF, 2012) 6.

⁸⁰ *Evaluation of the Poznan Strategic Programme on Technology Transfer: Final Report by the Technology Executive Committee*, 43rd sess., FCCC/SBI/2015, Annex III.

⁸¹ See “The GEF Solarchill Project” online: < <https://www.solarchill.org/english/about/>>; SolarChill Development, Testing and Technology Transfer Outreach, GEF Project ID 4682, Project Identification Form, online: < https://www.thegef.org/sites/default/files/project_documents/SolarChill%2520PIF%2520GEF_28092011_0.pdf> (SolarChill PIF)

⁸² See, SolarChill PIF, *Ibid.*

⁸³ *Ibid.*

⁸⁴ *Ibid.*

partner in the design, manufacturing and adaptation of the SolarChill technology.⁸⁵ Palfridge is reputed to have adapted the technology to suit the “higher ambient temperature found in tropical climates”.⁸⁶ These positives notwithstanding, the huge capital cost of the solarChill technology has been identified as its major challenge.⁸⁷ More fundamentally, it is doubtful if SolarChill align with the African States priority technology needs. For example, it is difficult to place the project under any of the needs identified in Kenya’s 2005 and 2013 mitigation TNAs.⁸⁸ Again, Swaziland’s 2016 TNA only pertains to adaptation needs.⁸⁹ This concern mirrors the observation of the Technology Executive Committee (TEC) in its 2015 evaluation of Poznan. It stated that rather than demand-tailored Poznan initiatives, some projects “had taken more of a technology-push approach, resulting in weakened relevance for country stakeholders and a difficulty in finding partners willing to invest in the technology”.⁹⁰

Similar trends as the SolarChill projects can be observed in the Poznan facilitated projects in Senegal and Cote d’Ivoire.⁹¹ To varying extents, the projects actively engaged and involved local companies from the manufacturing/construction stage.⁹² The issue of whether the projects are prioritised needs, however, surfaces again. If TNAs are indicators of prioritized EST needs of countries, the non-reference to the countries’ TNAs in the projects’ PIF are indicative of the non-priority status of these projects.

Overall, when appraised with the metrics set out above, the Poznan strategy, as evidenced by the reviewed projects, ticks most of the criteria less compatibility, particularly, projects’ compatibility

⁸⁵ *Ibid.*

⁸⁶ *Ibid.*

⁸⁷ *Ibid.*

⁸⁸ See generally, *Kenya’s Climate Change Technology Needs and Needs Assessment Report Under the United Nations Framework Convention on Climate Change* (National Environment Management Authority, 2005) 56 – 64; *Technology Needs Assessment and Technology Action Plans for Climate Change Mitigation* (National Environment Management Authority, 2013) 31 – 32.

⁸⁹ Deepa Pullanikkatil, *Swaziland Technology Needs Assessment Report 1 – Climate Change Adaptation* (CANGO, 2016)

⁹⁰ *Supra* note 80, para. 66.

⁹¹ See *Technology Transfer: Typha-based Thermal Insulation Material Production in Senegal*, GEF Project ID 4055, online:< https://www.thegef.org/sites/default/files/project_documents/4055-2009-09-28%2520PIF%2520Senegal%2520resubmitted%2520on%25202509-09_1.docx>; *Construction of 1000 T per Day Municipal Solid Wastes Industrial Composting Unit Akouedo-Abidjan*, online: < https://www.thegef.org/sites/default/files/project_documents/9-24-2009%2520ID4071Revised%2520PIF.pdf>.

⁹² This is, however, less so in the case of the Ivorian composting unit projects which was developed by Chinese company, Tianjin Universal Machinery Import & Export Corporation as a turn-key project.

with host states' priorities. Compared to the CDM, Poznan provides a relatively better template for EST transfer initiatives. It also makes evident the difference between a programme specifically designed for technology transfer (Poznan) and an economic concept with an ancillary transfer component (CDM). The point must be made that Poznan projects were not without commercial returns to the private entities involved in them. The difference, however, was that the transfer requirement was made an essential requirement, and not a waivable component like it was with CDM. Importantly, Poznan's location within the financial mechanism, allows for a coordinated approach to project design and finance.

3.4 A 'Recipient' and 'Source' Review of Transfer Initiatives

A recurrent theme in the above analysis is the subject of compatibility of implemented projects under the CDM and Poznan. The effectiveness of a transfer project is firstly a question of compatibility: Is the project aligned to the prioritized need(s) of the recipient State? The tables below provide some informed response to this query. The first table contains the technological needs, project ideas and barriers identified by Ghana, Mauritius and Kenya between 2003/2005 (1st TNA) and 2012/2013 (2nd TNA) as contained in their TNAs and Project ideas. The second table contains the technology transfer initiatives of the European Union, the USA and Japan within the same timeframe. Reference is also made to the 1st (2006), 2nd (2009) and 3rd (2013) TNA synthesis reports of the UNFCCC. The use of TNA as analytical tool should not be taken as a wholesale endorsement. It, however, represents an appropriate mechanism for the analysis done in this chapter.

Recipients' Needs⁹³ (Table 1)

Country	1 st TNA	2 nd TNA	Project Ideas	Barriers
Ghana	<p>Mitigation: Energy efficient lighting using compact fluorescent lamps (CFL); Industrial energy efficiency; Landfill Methane Gas Recovery.</p>	<p>Adaptation: Integrated Monitoring and Early Warning System; Integrated Nutrient Management; community-based extension agents.</p>	<ul style="list-style-type: none"> • Provision of 100 run-off storage facilities (1 million m³ each) for 100 rural communities • Capacity building in post construction support for community managed water systems 	<p>Economic and financial barriers; inadequate technical capacity; institutional barrier (lack of community ownership; conflicting sectoral policies)</p>
Mauritius	<p>Mitigation: Demand side Management; bi-fuel vehicles and traffic lights coordination; landfills, treatment plans and composting/recycling;</p> <p>Adaptation: Extension of irrigation facilities; adoption of new agricultural techniques; composting and trash blanketing; setback distance enforcement, coral reef protection artificial growth; water recycling...</p>	<p>Mitigation: wind turbines (utility scale); PV (> 1 MW); EE Boilers</p> <p>Adaptation: Desalination; rainwater harvesting; hydrological model; upscaling local integrated pest management technologies; micro irrigation (gravity fed drip & mini and micro sprinkler irrigation); decentralized pest and disease diagnosis service; restoring coastal vegetation; wetland protection; dune restoration; rock revetment</p>	<ul style="list-style-type: none"> • Desalination plant with production capacity of 300m³/day, treating either seawater with salinity greater than 10,000ppm or brackish water with salinity of 1000 – 10,000ppm. • Simply designed roof top rainwater harvestor with complete piping, 600 L capacity tanks and absorption pit. • Implement hydrological model technology within 5 years. 	<p>Economic and financial (High cost capital; inappropriate financial incentives and disincentives); legislations; lack of skilled technical staff.</p>

⁹³ The information contained here are synopsis of the contents of TNAs, TAPs, project ideas and barriers submitted by Ghana, Mauritius and Kenya between 2003/2004 and 2012/2013. While an attempt is made to capture vital contents, the table is not a comprehensive representation of all the documents submitted by the countries.

Country	1 st TNA	2 nd TNA	Project Ideas	Barriers
Kenya	<p>Mitigation: Power plant efficiency improvement; fuel switching; energy efficient appliances; improved livestock management; improved rice cultivation; water recycling and composting</p> <p>Adaptation: Human capacity development and advanced technologies in Global Atmosphere and Carbon Cycle Observation;</p>	<p>Mitigation: Solar Home Systems (SHS) and Solar Dryers; Methane capture from bio-digesters and waste paper recycling.</p> <p>Adaptation: drought resistant sorghum; drip irrigation; hay preservation; roof rain water harvesting; surface runoff water harvesting; and solar powered desalination.</p>	<ul style="list-style-type: none"> • Diffuse 165,000 SHS units by 2017; target 83,000 households annually in 24 counties; reach 332,000 households by 2018 and provide access to 1.5 million households by 2030. • At least 120,000 households should have access to biogas by 2030. • Introduction of 10,000 surface runoff water harvesting systems, 50,000 roof rainwater harvesting units and 500,000 drip irrigation for agriculture and household use. • Introduction of drought tolerant sorghum varieties to 100,000 farmers in 10 selected Arid and Semi Arid Land (ASAL) counties by 2017. 	Economic and financial (high initial investment; lack of subsidies; high interest rates); inadequate information and awareness; lack of research and development; weak regulatory framework; inadequate skilled personnel; inadequate legal framework; lack of market links.

Sources' Initiatives (Table 2)

Source	1 st NC	2 nd NC	3 rd NC
EU	<ul style="list-style-type: none"> • The Regional solar programme (phase II) (drinking water systems) – Sahelian countries • Capacity Building of Developing NGOs to implement Principle 10 – 	<ul style="list-style-type: none"> • Development support for generating biomass from household waste – Rwanda • Community-based Natural Resource Management Enterprise Support - Namibia 	<ul style="list-style-type: none"> • Chololo Eco-Village (Integrated Approach to Adaptation and Resilience) – Tanzania. • Improving livelihoods and food security in rural Uganda

	<p>Cameroon, Malawi, South Africa, Uganda, Zimbabwe</p> <ul style="list-style-type: none"> • Framework for designing afforestation, reforestation and revegetation projects in the CDM – Kenya, Uganda • Clean Air Initiative – Sub-Saharan Africa • Tropical forests and climate change adaptation (criteria and indicators) – Burkina Faso, Mali, Ghana 	<ul style="list-style-type: none"> • Village Tree Enterprise Project – West Africa • Mobilization and reinforcement of the capacity of SMEs involved in forest related products – Central Africa • Installation of a steam engine powered generation set at Charter Sawmill – Zimbabwe • Hydro, Biopower projects - Ethiopia • The Regional Solar Programme – Sahelian countries 	<ul style="list-style-type: none"> • Mainstreaming of climate change into national systems and policies – Mozambique
USA	<ul style="list-style-type: none"> • Famine Early Warning System Network (assessment of vulnerability to food insecurity) – Kenya, Malawi, Mali, Mauritania, Niger, Mozambique, Rwanda, Somalia, Sudan, Uganda, Zambia, Zimbabwe • Methane recovery and use as a clean energy source (framework for encouraging investment in carbon capture) - Nigeria 	<ul style="list-style-type: none"> • Establishment of SERVIR (a regional visualization and monitoring system) regional operational facility for East Africa – Kenya • Construction of Coalbed Methane power plant – Botswana • Geothermal Power Generation - Ethiopia 	<ul style="list-style-type: none"> • Increased capacity to utilize geospatial information – East Africa. • Famine Early Warning System Network (assessment of vulnerability to food insecurity) – West, East and South African countries. • Forest carbon monitoring and measurement – Gabon, Congo.
Japan	<ul style="list-style-type: none"> • Group training course to develop National Inventories and Strategies against Climate Change – Senegal, Cote d’Ivoire and Sao Tome and Principe 	<ul style="list-style-type: none"> • Community-based flood disaster management to adapt in the Nyando River Basin – Kenya • Zafarana Wind Power Plant Project – Egypt 	<ul style="list-style-type: none"> • Desalination plan of groundwater – Tunisia • System of measures against illegal logging of tropical forest – Togo • Promoting sustainable forest management – Africa • Developing counter-measures against landslide – Ethiopia • Ground water development – Tanzania • Strengthening capacity of electric power pool – Eastern and Southern Africa.

The following can be deduced from the above tables:

- i. There is a marked difference between the technological needs of the recipient states surveyed under TNA 1 and TNA 2. While the first emphasised demand side mitigation technologies, the latter contains more supply side technologies.
- ii. Recipient States' technological needs primarily entailed community initiatives and/or simple (local) technologies. With the exception of few African States, like South Africa, highlighted needs were mostly 'subsistent' rather than 'developmental'.
- iii. Economic/financial and technical barriers were identified by all the recipient States.⁹⁴
- iv. Most of the proposed projects by surveyed recipients were decentralised and often village or household based.
- v. Water and agriculture were identified as the priority adaptation areas by the surveyed recipients.
- vi. Most of the initiatives by source-States, focused on (soft) capacity building, as against transfer of hardware technologies or technology development know-how.
- vii. It is unclear in the national communications, whether the TNAs or proposed project ideas by recipient States played any role in the project undertaken by source-States.
- viii. Taking Kenya as an example, while all the surveyed source-States initiated transfer projects in the country, only the need on geospatial observation and information seem to have been responded to.
- ix. While identifying lack of capacity as a barrier, none of the sampled recipients listed collaborative research and development centres in their project ideas.
- x. Despite their posturing at the international level, none of the sampled recipients identified patent or IPRs as a barrier.
- xi. Although source-States referenced collaborative R&D projects in Asian and Latin American States, no such project was referred to in respect of the recipients sampled.

Two striking findings from the foregoing are: the prevalence of locally accessible technologies in the project ideas of recipient-States and the non-identification of 'patent' as a barrier. There are few likely reasons for the prevalent reference to locally accessible technologies. One is the TNA process which is structured to guide recipient-States to prioritise sectors and technologies from a pool.⁹⁵ Sub-Saharan African States generally prioritise water and agricultural sectors, which reflect

⁹⁴ Same finding was made by the UNFCCC in its 1st, 2nd and 3rd synthesis reports. See SBSTA, "Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention" 24th Sess., 18 – 26 May, 2006, FCCC/SBSTA/2006/INF.1 at 24; SBSTA, "Second Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention" 30th Sess., 1 – 10 June 2009, FCCC/SBSTA/2009/INF.1 at 29; SBSTA, "Third Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention" 39TH Sess., 11 – 16 November 2013, FCCC/SBSTA/2013/INF.7 at 25

⁹⁵ United Nations Development Programme (UNDP), "Handbook for Conducting Technology Needs Assessment for Climate Change" (2010).

their immediate needs.⁹⁶ The relevant technologies in respect of these sectors are largely available in the recipient-States, whether by reason of traditional practices (e.g. rain water conservation) or the commonality of the technology (e.g. water desalination). The main barrier faced by the States is lack of financial resources to provide the available technologies to their citizenry. Consequently, it is doubtful if the scenario described above constitutes ‘technology transfer’ in its strict sense. International technology transfer essentially entails a home country, host country and transaction component (transferred technology hitherto unavailable in the host State).⁹⁷ At best, what happens intra-State is technology diffusion.

The non-recognition of IPRs/patent as a transfer barrier is also tied to the foregoing analysis. Since the technologies are largely available in-State, the issue of patent/IPRs as a barrier is unlikely. This is however different for South Africa, which prioritised ESTs like solar power, clean coal technologies, wind power, new crop species and cultivars, information technology, vulnerability research, water efficiency technology and climate-sensitive building design.⁹⁸ Thus, though referencing the need for in-State capacity and “creation of an enabling environment and supporting systems” as crucial, ‘intellectual property issues’ were ranked as a major barrier.⁹⁹ South Africa, in its TNA, noted that:

In brief, the position is that balanced partnership arrangements, in which the technology needs are determined by the receiving partner, and where, if possible, the receiving partner is involved over a long period of time in the co-development and local adaptation of the technology, are preferable to donor-driven, hit-and-run, technology dumping exercises ... The acceptance of open-source solutions in architecture and software development is one way of addressing IPR constraints. However, these and other approaches do not fully remove the barrier. Critical mitigation and adaptation technologies need to be treated as global public goods.¹⁰⁰

⁹⁶ According to the GEF, as of June 2012, 66% of adaptation projects under the Poznan long term program were carried out in Africa, this is as against 12% of mitigation projects. Hence, while the continent ranked the highest as per adaptation projects, it came near-last in respect of mitigation projects. See Chizuru Aoki, *supra* note 79 at 24 – 25.

⁹⁷ NMohan Reddy et al, “International technology transfer: A review” (1990) 19:4 Res Policy 285, online: <<http://linkinghub.elsevier.com/retrieve/pii/004873339090015X>>.

⁹⁸ South African Department of Science and Technology, “South Africa’s Climate Change Technology Needs Assessment: Synthesis Report” (2007) online: <http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNR_CRE/e9067c6e3b97459989b2196f12155ad5/9ecba2a40fe04948859b9930a40be9f7.pdf> 13.

⁹⁹ *Ibid* at 40.

¹⁰⁰ *Ibid* at 38 - 39.

As well, it appears that the more sophisticated the technological needs, the higher the possibility of patent and other market incidences constituting a barrier to transfer. This conclusion mirrors John Barton's finding that while basic approaches to solving 'technological problems' have long been off-patent, improvements on or new features of such technologies are often patented.¹⁰¹ Another essential point identified by South Africa is the need to co-develop technologies to aid more effective transfer. This is a subject not contained in the previous TNAs surveyed. Again, this can be attributed to the kind of technologies prioritised by recipient-States. Again, the preference of source-States for training on 'soft' skills must be highlighted. It is argued that though such soft skills are necessary, they cannot substitute 'hard ware' know-how transfer.

Since TNAs are a core part of the UNFCCC transfer system, an inquiry into UNFCCC post-TNA process is relevant. Such an inquiry is more fitting for a separate research, but it is briefly considered here. TNAs pre-existed Poznan, but they became more structured under the Poznan regime. Poznan considers TNA as "a country-driven activity to assist in identifying and analyzing priority technology needs for mitigating and adapting to climate change, particularly in developing countries".¹⁰² TNAs, amongst other instruments, provide the GEF with a pool of projects for which it deploys its (limited) funding under what it calls 'piloting priority technology projects'.¹⁰³ The priority technology component was designed to address the weak link between GEF's prior technology transfer projects and the TNAs/national communications of countries.¹⁰⁴ In shortlisting a project as priority, the GEF considers whether the country has been previously funded and the project's "multiple local and global benefits that contribute to private sector investment in, and financing of, technology transfer in developing countries". It appears that in identifying the projects to fund, GEF organises a 'call for proposals' distinct from the TNA process.¹⁰⁵ Further, GEF party States are only eligible for only one project of between \$1 - \$3 million.¹⁰⁶ These terms are immensely limiting as to the kind and scope of projects for which recipient-States can receive

¹⁰¹ Barton, *supra* note 2 at 17.

¹⁰² Aoki, *supra* note 79 at 8.

¹⁰³ Aoki, *supra* note 79 at 11.

¹⁰⁴ Report of the GEF on the Elaboration of a Strategic Programme to Scale up the Level of Investment in the Transfer of Environmentally Sound Technologies, SBI, 29th Sess., (2008), FCCC/SBI/2008/16, 23.

¹⁰⁵ Aoki, *supra* note 79 at 11.

¹⁰⁶ *Supra* note 104 at 15.

support. Potentially, and as has been shown above, this post-TNA structure leaves a lot of TNAs unattended.

3.5 A Review of Non-UNFCCC International Platforms for EST Transfer: Corporate Entities and Non-Governmental Organizations.

So far, examples of State – State transfer initiatives have been reviewed through the lenses of direct transfers by States or through specific UNFCCC programmes. Two other pathways are transfers through corporate endeavours and NGOs. It has long been noted that corporate pathways – foreign direct investment, commercial lending and equity investment – have become the most engaged pathways of EST transfers.¹⁰⁷ This finding has, at best, been anecdotal. This is because it is difficult to track the level of technology transfer in the normal course of a company’s business. Nevertheless, in analyzing the transition from official development assistance (ODA) to corporate pathways as dominant tools of transfer, the IPCC identified three concerns:

First ..., private sector investment has been very selective. While almost all countries have benefited to some degree, a handful of countries (East Asia and Latin America) have received most of the attention ... Second, ODA is still important for those sectors where private sector flows are comparatively low, like agriculture, forestry, human health and coastal zone management ... Third, private investment, most notably foreign portfolio equity investment and commercial lending, is volatile. Many developing countries have found to their distress that private investment can quickly dry up if investors perceive more attractive – or less risky – opportunities elsewhere.¹⁰⁸

About two decades after the above findings, little has changed. The preference of EST companies for BASIC States, particularly China and India, is undisputed.¹⁰⁹ The table below gives an idea of this disparity between 2000 – 2006:¹¹⁰

Table 3 (*Billions of USD.*)

Region	Total Capital Inflows	Total Equity Inflows	Total Debt Inflows
Developing Asia	145.53	116.33	27.20
Europe and Central Asia	108.50	49.43	59.07
Latin America and Caribbean	69.41	68.90	0.51
Middle East and North America	10.78	10.35	0.43
Sub-Saharan Africa	16.81	16.91	-0.3

¹⁰⁷ IPCC, *supra* note 3 at 17.

¹⁰⁸ *Ibid* at 18.

¹⁰⁹ See generally Barton, *supra* note 2.

¹¹⁰ Bilal Keskinsoy, “A Data Survey on International Capital Inflows to Developing Countries” (2017) Munich Personal RePEc Archive Paper No. 78957, 19.

Clearly, in some ways, it is not farfetched to, attribute the low level of EST transfers to Africa to the level of private investment, since such investment is the dominant pathway for technology transfer. The second concern raised in the IPCC research is the prioritized needs of developing States, most of which do not often attract investment. For example, it has been shown above that African countries surveyed under the recipient – source review, prioritise water and agriculture technologies. Even when African countries prioritise energy related technologies, like solar, the need to adapt the technology to suit the unique terrain of such countries, vis-à-vis the financial incapacity or market prospects of these countries, do not incentivize investment.¹¹¹ The third valid concern is that political instability and regulatory gaps in many African countries disincentivize investment.

The foregoing concerns reaffirm one of the central hypotheses of this work, that is, the anomaly of subjecting ESTs to the vagaries of the market place. It brings to the fore the dangers of a marketized EST regime on (lower tier) developing States, particularly African countries. Due to demographic and economic factors, these countries might never provide markets as attractive as China, India and Brazil, and their political terrain might remain unstable, though the needs of their people remain. The claim of TWAIL II that the ‘State’ should be considered as a distinct entity from its ‘people’,¹¹² comes into play here. When the needs of the third world people, rather than the economic and regulatory structures of the recipient-State become the chief driver of EST ‘investment’ decision, the level of investment in third world countries will rise. But the question remains how such a need-driven investment model will yield returns for the investing company. This subject will be considered more closely in chapter five through the formulation of a ‘normative payment’ concept and adaptation of the social enterprise model.

Notwithstanding the above, corporate entities, have in the recent past, initiated non-market-oriented technology transfer stand-alone projects. Anna Davies appraised such transfer initiatives.¹¹³ But given the notoriety of the subject of patent and EST transfer, the increasing

¹¹¹ Dalindyebo Shabalala, “Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility but Common but Differentiated Responsibilities” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016) 174.

¹¹² See Antony Anghie & B.S. Chimni, “Third World Approaches to International Law and Individual Responsibility in Internal Conflicts” (2003) *Chinese Journal of International Law* 77 at 83.

¹¹³ See Anna Davies, “Partnership and Sharing: Beyond Mainstream Mechanisms” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 108.

inclination of corporate organisations towards a patent commons or patent pledges is worth commenting on.¹¹⁴ A stand-out example of this is the eco-patent commons. A brain child of IBM, eco-patent was launched in 2008.¹¹⁵ Before its demise in 2016, it had in its ranks, about eleven multi-national companies¹¹⁶ which contributed about one hundred patents.¹¹⁷ The objectives of the initiative included: providing an avenue through which environment-protective innovations and solutions can be shared easily and lead to other innovation and the promotion of collaboration between “businesses that pledge patents and potential users to foster further joint innovations”.¹¹⁸ As stated elsewhere, a patent pledging initiative, like eco-patent, while curtailing the offensive use of pledged patents, stops short of “abandoning or contributing them to the public domain”.¹¹⁹ Importantly, participating companies are only expected to contribute patents that are not “central to the firm’s commercial interests... or represent an essential source of business advantage”.¹²⁰ Inevitably, this resulted in the contribution of low quality patents by the companies.¹²¹ In conducting a post-mortem of the eco-patent initiative, Contreras et al, found *inter alia*, that the initiative failed to meet its technology transfer objective.¹²² They note that:

Another issue raised by several respondents was that the EcoPC sought to promote the dissemination of green technologies through patents alone. Yet, complex technologies often cannot be understood and implemented, especially by non-experts working in the developing world, exclusively through patent disclosures... Some form of technology assistance or transfer is generally required to enable local users to take advantage of patented technologies, or even to realize that such technologies are available and applicable to local problems.¹²³

¹¹⁴ See for examples the Eco-Patent commons, online: < <http://www.corporateecoforum.com/welcome-to-the-eco-patent-commons/> > and Green Xchange, online: < <http://imaginationforpeople.org/en/project/green-xchange/> >

¹¹⁵ Wayne Balta, “Welcome to the Eco-Patent Commons” online: < <http://www.corporateecoforum.com/welcome-to-the-eco-patent-commons/> >

¹¹⁶ Bosch, Dow, Fuji-Xerox, HP, IBM, Nokia, Pitney Bowes, Ricoh, Sony, Taisei and Xerox. See *Ibid*

¹¹⁷ *Ibid*.

¹¹⁸ Kevin Greenleaf & Michael Byrne, “Triumph of the Eco-Patent Commons” (2011) 4 *Landslide* 43.

¹¹⁹ Jorge L Contreras, Bronwyn H Hall & Christian Helmers, “Assessing the Effectiveness of the Eco-Patent Commons: A Post-mortem Analysis” (2018) 161 *CIGI Pap*, online: <[https://www.cigionline.org/sites/default/files/documents/Paper no.161_3.pdf](https://www.cigionline.org/sites/default/files/documents/Paper%20no.161_3.pdf)> 1. Hence, “to pledge a patent to the EcoPC, the owner was required to make an irrevocable covenant not to assert the patent — or “any worldwide counterparts” ... — against any infringing machine, manufacture, process or composition of matter that “reduces/eliminates natural resource consumption, reduces/eliminates waste generation or pollution, or otherwise provides environmental benefit(s)”. *Ibid* at 3 – 4.

¹²⁰ *Ibid* at 7.

¹²¹ *Ibid* at 17.

¹²² *Ibid* at 8.

¹²³ *Ibid*.

The above finding has immense implications for the patent-barrier debate in the global EST transfer discourse. As noted in chapter two, developed States had hitherto represented that since most technologies are not patented in developing States, there is no supply-level barrier to the transfer of such technologies. However, the above empirical finding has shown that this contention is not accurate. The mere non-patenting of an invention in a developing State or the availability of such technology in ‘the public space’ does not qualify as effective technology transfer. Complementing the conclusion reached elsewhere in this chapter, the study by Contreras et al of the eco-patent initiative found that “the EcoPC was conceived and implemented by the suppliers of technology without consulting the demand side (potential users of those patents/technologies)”.¹²⁴ Therefore, whereas the eco-patent initiative might be said to meet the availability and affordability requirements of an effective transfer project, it fails to meet the conditions of cooperation, compatibility, and adaptability.

The involvement of not-for-profit organizations in the transfer of ESTs to Africa is worthy of mention. For instance, Greenpeace (with UNEP) originally conceived the Solarchill project, and the NGO “secured the initial \$150,000 start-up funds for research and development”.¹²⁵ Again, Shell Foundation was established in 2002 “to increase the provision of energy to the poor through the innovation and scale-up of decentralized energy solutions, such as solar lighting, biogas, biomass gasification...”¹²⁶ They seek to achieve this by supporting start-ups like Envirofit and d.light.¹²⁷ Collaborating with the U.N. Foundation, the Global Alliance for Clean Cookstoves was established in 2010 to facilitate the distribution of clean stoves to one hundred million households by 2020.¹²⁸ According to Shell, their initiatives have benefited fifty-four million people, created 40,000 jobs and saved 8.2 million tonnes of carbon.¹²⁹ With a presence in Sudan and Uganda, Potential Energy is another example of a not-for-profit set-up with the mission to “improve access

¹²⁴ *Ibid* at 16.

¹²⁵ Greenpeace, “SolarChill Backgrounder” online: <https://www.greenpeace.org/canada/Global/canada/report/2011/12/SolarChill%20Backgrounder%20Canada%2011_2011.pdf>

¹²⁶ <<http://www.shellfoundation.org/Our-Focus/Access-To-Energy>>

¹²⁷ *Ibid*.

¹²⁸ <<https://www.clintonfoundation.org/clinton-global-initiative/commitments/scaling-adoption-clean-efficient-cookstoves>>

¹²⁹ *Supra* note 126.

to efficient stoves to improve lives”.¹³⁰ Its Berkeley-Darfur Stove, claimed to have been “designed by engineers at Lawrence Berkeley National Lab using the knowledge and input of Local Darfuri women”, 270,000 people hitherto exposed to toxic carbon monoxide are said to have been impacted.¹³¹

While NGO led initiatives are diverse, they share some common features. First, projects generally engage third world people directly. This is contrary to other transfer pathways which primarily focus on an agency of government for the execution of centralized projects. This feature also speaks to the kind of technologies dealt with by these NGOs, i.e., decentralized technologies like solar panels and improved seedlings. This appears to be an apt approach, particularly for the sub-Saharan Africa energy sector.¹³² Second, most projects are designed, and the technologies are manufactured outside recipient States.¹³³ Hence, these initiatives primarily entail the transfer of hardware. Third, entities involved in such transfer projects are styled ‘social enterprises or entrepreneurship’.¹³⁴ These ventures have been described as combining the “characteristics represented by Richard Branson and Mother Teresa”, focusing “first and foremost on the social and/or ecological value creation”.¹³⁵ In all, affordability and limited availability (hardware) are the strengths of NGO-led transfer initiatives. But the projects have inherent sustainability limitations. For example, while provision of environment-friendly stoves at low cost is laudable, it is not sustainable in itself. Sustainability of such a project can only be ensured if the capacity to reproduce and/or re-invent it exists in the community and country. The eco-patent commons example instructs that even the most well-intentioned and supported non-profit initiative can go extinct, as can NGO-led initiatives. Taking the case of *Potential Energy* in Sudan as an example, Sudanese have only been

¹³⁰ < <http://www.potentialenergy.org/> >

¹³¹ < <http://www.potentialenergy.org/uganda-project/> >

¹³² See “Decentralized Renewables: The Fast Track to Universal Energy Access” (2016) online: < https://static1.squarespace.com/static/532f79fae4b07e365baf1c64/t/578d7f206b8f5bebe7f47444/1468890916501/Power_for_All_POV_May2016.pdf > and Shadreck Situmbeko, “Decentralised Energy Systems and Associated Policy Mechanisms – A Review of Africa” (2017) 7 *Journal of Sustainable Bioenergy Systems* 98 – 116.

¹³³ For example, the Berkeley-Darfuri stove was designed in the United States, manufactured in India, and assembled in Sudan. *Supra* note 128.

¹³⁴ Envirofit, for example, is described as “a social enterprise that innovates smart energy products and services that improve lives on a global scale”. See < <http://envirofit.org/> >

¹³⁵ Schwab Foundation, “What is a Social Entrepreneur?” online: < <http://www.schwabfound.org/content/what-social-entrepreneur> >

trained on how to assemble the stoves. The survival of the initiative, in the event *Potential Energy* ceases operation in Sudan, is doubtful.

3.6 South – South Technology Transfer: The Journey So Far

South – south transfer¹³⁶ is not often discussed as an EST transfer pathway. However, with the continued economic growth of the BASIC States, particularly, China and India, attention is being increasingly paid to this genre of transfer. More so as these ‘southern’ States (China and India) have become dominant in the EST industry. This is especially true for China which is said to now have technology leadership in the hydropower, solar and wind energy industries.¹³⁷ The question to answer in this section is if there is any difference in the approach of (advanced) ‘southern’ States to technology transfer, compared to their northern counterparts. This inquiry is important given that States like China and India had previously been in the vanguard of the G77 clamour for a more accessible and enabling EST transfer regime. Further, this inquiry flows directly from the argument made in chapter one that rather than the term ‘third world’ being a geographic, economic or historical descriptor, it should be a brand for an alternative agenda to a neo-liberally organised international system. It was argued that, the decisive question on determining whether BASIC States are ‘third world’ is if they have “kept faith with the alternative agenda of the South or (if they) are reproducing and reinforcing the hegemonic and imperialistic agenda of the North”. As will be seen from the few examples below, it appears emerging States have, so far, re-enacted processes and structures they hitherto condemned.

In recent years, various research has been conducted into varying aspects of South – South technology transfer.¹³⁸ Their findings provide support for the above conclusion that there is no

¹³⁶ In 2009, the United Nations adopted the Nairobi Outcome Document on South – South Cooperation. The document, in part, noted that “South-South cooperation is a common endeavour of peoples and countries of the South, born out of shared experiences and sympathies, based on their common objectives and solidarity...” Further, it noted that “the proximity of experience is ... a key catalyst in promoting capacity development in developing countries and ... accentuates the principles of South-South cooperation”. It, however, clarified that “South-South cooperation is not a substitute for, but rather a complement to, North – South cooperation”. See “Nairobi Outcome Document of the High Level United Nations Conference on South – South Cooperation” (Annex) 64th sess., 44/222 A/RES/64/222 (2009), paras 18, 17 and 14.

¹³⁷ Frauke Urban, “China’s Rise: Challenging the North – South Technology Transfer Paradigm for Climate Change Mitigation and Low Carbon Energy” (2018) 113 *Energy Policy* 320 at 322.

¹³⁸ See for examples, United Nations Environment Programme(UNEP) - GREEN economy, “South-South trade in renewable energy: a trade flow analysis of selected environmental goods” (2014) 104, online: <http://www.greengrowthknowledge.org/resource/south-south-trade-renewable-energy-trade-flow-analysis-selected-environmental-goods?utm_source=GGKP+Knowledge+Update,+Issue+2014-5&utm_campaign=GGKP+Knowledge+Update,+Issue+2014-4&utm_medium=email>; TEC, “South – South

difference between south – south transfer and north – south transfer. First, like other transfer pathways, Africa benefits the least from south-south transfer initiatives. Asia and Latin America benefit the most from this.¹³⁹ Second, identified barriers to the transfer of ‘northern’ technologies are the same as the barriers to transfer in the south – south context. For example, TEC identifies limited knowledge, lack or inadequate access to financial resources, inadequate legal and regulatory frameworks, insufficient technical capacity and intellectual property concerns, as barriers to south – south transfer.¹⁴⁰ Third, ‘southern’ technologies are also extensively protected by patents. For example, China led other countries in the registration of patents, trademarks, industrial designs and utility models in 2015 and 2016.¹⁴¹ As noted elsewhere, “Chinese firms like Trina, Yingli, JA Solar and Inter Solar hold a comparable number of key patents compared with international competitors”.¹⁴² It is also recorded that Chinese firms hold about 95% of solar water heater technologies worldwide.¹⁴³

Further, following the same trend as the ‘north’, while R&D in ESTs are initially funded by the southern States, they are subsequently commercialised through privatization. China, again, exemplifies this through its solar water heater technology which was developed by scientists at Tsinghua University through government funding, and was subsequently commercialized in 1998.¹⁴⁴ Lastly, source southern countries, in most cases, transfer hardware technologies without software and orgware. Urban gave the example of the Kamchay Dam project built by China in Cambodia, noting that while capital goods and equipment were transferred, “there was very limited evidence of the transfer of skills, know-how and expertise for operation and maintenance and for developing domestic production or innovation”.¹⁴⁵ It was further noted that the build, operate and

cooperation and triangular cooperation on technologies for adaptation in the water and agriculture sectors” (2017); Frauke Urban, “China’s rise: Challenging the North-South technology transfer paradigm for climate change mitigation and low carbon energy” (2018) 113:August 2017 Energy Policy 320, online: <<https://doi.org/10.1016/j.enpol.2017.11.007>>.

¹³⁹ United Nations Environment Programme(UNEP) - GREEN economy, *supra* note 143 at 8.

¹⁴⁰ TEC, *supra* note 138 at 5.

¹⁴¹ WIPO, *World Intellectual Property Indicators 2017* (Geneva, WIPO; 2017) 7.

¹⁴² Urban, *supra* note 138 at 325.

¹⁴³ *Ibid.*

¹⁴⁴ Frauke Urban, Sam Geall and Yu Wang, “Solar PV and Solar Water Heaters in China: Different Pathways to Low Carbon Energy” (2016) 64 Renewable and Sustainable Energy Reviews 531 at 537.

¹⁴⁵ *Ibid* at 323.

transfer agreement put the transfer date of the dam at 2050, and training of Cambodians will only occur in 2050.¹⁴⁶

While only China's engagement with other southern countries has been focused on in this analysis, the above observations would well apply to other emerging developing States like India and Brazil.¹⁴⁷ This leads to the conclusion that there is no marked difference between North-led transfer initiatives and South – South transfer. Rajagopal had suggested that:

It is not automatically the case that the rise of (BASIC) States would lead to progressive or regressive international law ...It is also not clear if (BASIC) countries behave significantly differently towards weaker, smaller countries, compared to powerful Northern States.¹⁴⁸

The conclusion reached in respect of the EST transfer regime shows that BASIC States have not behaved 'significantly differently towards weaker, smaller countries'. The same market orientation and capitalistic drive which motivates the Northern EST industry is the same for the emerging southern EST industry. Chimni made this same assertion, noting that "the emerging economies no longer pursue their traditional anti-imperialist policies ... (they) are carrying out neoliberal reforms".¹⁴⁹

3.7 Summary of Findings

This chapter has considered select examples under five different pathways through which EST transfer occurs – the CDM, Poznan strategy, Corporate entities, not-for-profit organizations and south – south cooperation. While the initiatives considered are by no means exhaustive,¹⁵⁰ they provide understanding of the dominant trends in the global EST transfer construct. One of the cross-cutting themes in the pathways considered, apart from Poznan, is the absence of top-level (research,

¹⁴⁶ *Ibid* at 325.

¹⁴⁷ See for example Brazil's contribution to Africa Bio-fuel industry, the emphasis of programmes on cultivation of raw materials like jatropha, cassava and sugar cane and the limited transfer of actual R&D know-how. See UNCTAD, *State of South-South and Triangular Cooperation in the Production, Use and Trade of Sustainable Biofuels*, (Geneva, UNCTAD; 2012) 15 – 19.

¹⁴⁸ Balakrishnan Rajagopal, "International Law and Its Discontents: Rethinking the Global South" (2012) 106 *American Society of International Law Proceedings* 176 at 179.

¹⁴⁹ B.S. Chimni, "Capitalism, Imperialism, and International Law in the Twenty-First Century" (2012) 14 *Oregon Review of International Law* 17 at 34. As also pointed out by Prof. Ikenberry, "China and other emerging great powers do not want to contest the basic rules and principles of the liberal international order; they wish to gain more authority and leadership within it". See John Ikenberry, "The Future of the Liberal World Order: Internationalism After America" (2011) *May-June Foreign Affairs* at 56 – 57.

¹⁵⁰ There are other EST transfer initiatives like OECD's Centre for Technology Innovation (CTI) and the International Renewable Energy Agency (IRENA).

development and manufacturing) know-how transfer to African countries. Another is the disconnect between initiatives and actual needs of these countries. Similar to the first finding, it was found in a recent mapping of transfer initiatives that “relatively few programmes support national networks and innovation systems in a significant manner”.¹⁵¹ The table below summarises the above findings using the assessment metrics earlier developed.

Table 4

ENABLEMENT			
Accessibility		Sustainability	
<i>Availability</i>	CDM: Partial(hardware) Poznan Strategy: Full Corporate Initiatives: Partial Not-for-profit: Partial South-South: Partial	<i>Compatibility</i>	CDM: Partial or Nil Poznan Strategy: Partial Corporate Initiatives: Partial or Nil Not-for-profit: Partial South-South: Partial
Accessibility		Sustainability	
<i>Affordability</i>	CDM: Partial Poznan Strategy: Partial Corporate Initiatives: Nil Not-for-profit: Full South-South: Nil	<i>Adaptability</i>	CDM: Partial or Nil Poznan Strategy: Partial Corporate Initiatives: Nil or Partial Not-for-profit: Partial South-South: Partial or Nil
<i>Cooperation</i>	CDM: Partial Poznan Strategy: Full Corporate Initiatives: Nil Not-for-profit: Partial South-South: Partial	<i>Maintenance</i>	CDM: Partial Poznan Strategy: Partial Corporate Initiatives: Partial Not-for-profit: Partial South-South: Partial

The summary assessment here draws from the specific examples considered in this chapter which, admittedly, are limited. A more comprehensive study of initiatives is necessary for a more authoritative conclusion on the various international EST transfer pathways. Tentatively, however, while the Poznan Strategy appears to be the most ‘enabling’ transfer policy, corporate initiatives rank the least. Overall, it can be concluded that, as this work postulated, a market-controlled EST transfer regime is inappropriate, especially for African developing and least developed states.

¹⁵¹ *Mapping Climate Technology Development and Transfer Activities and Initiatives under and outside the Convention relevant to the Implementation of the Paris Agreement*, SBSTA, 45th Sess., FCCC/SBSTA/2016/INF.9 (2016), para 162.

CHAPTER 4: THE TECHNOLOGY MECHANISM - PROSPECTS AND CHALLENGES FOR AFRICAN COUNTRIES

The diverseness and complexity of the global EST transfer regime, as exemplified by the UNFCCC, are evident from the foregoing chapters. Also evident, however, are the flaws of the regime. Some of these flaws (already identified in chapters two and three) include: absence of coordination of the various multilateral, country-led, private and not-for profit transfer initiatives; lopsided concentration of initiatives; failure to transfer ‘actual’ technological know-how; absence of, or limited collaborative research and development projects; dominance of one-off-projects as against sustained and sustainable initiatives; non-implementation of Technology Need Assessments (TNAs); non-alignment of transfer projects with the developmental needs of a recipient-State; and shortage of finance. In initially conceiving of the technology mechanism, the G77 and China considered many of these flaws.¹

The technology mechanism, as endorsed in Article 10 of the Paris Agreement (PA), is a far-cry from what was originally proposed by the G77 in 2008. However, it has been suggested elsewhere that it marks an improvement from what was previously obtainable.² But to what extent is the technology mechanism different from previous technology transfer initiatives? To what extent has the present structure reiterated past structures and/or flaws? What are the prospects of African States benefiting more from the current structure than they did under the previous initiatives? These questions will be considered in subsequent sections of this chapter, but the obvious must be noted prefatorily. The technology mechanism (TM) is the first stand-alone wholesome institutional set-up for EST transfer under the UNFCCC.³ Again, the characterization of the set-up as ‘technology mechanism’, as against ‘technology transfer mechanism’ by the G77, highlights a key inspiration for its original design. That inspiration is the desire of the developing states to transit from being mere recipients of technologies to collaborators in innovation.⁴ The objective of the proposed TM reads:

¹ *Proposal by the G77 & China for A Technology Mechanism under the UNFCCC*, online: <http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/technology_proposal_g77_8.pdf>

² Heleen de Coninck & Ambuj Sagar, “Technology Development and Transfer (Article 10)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 263 at 276.

³ The Expert Group on Technology Transfer (EGTT) is the closest arrangement to the TM. But as noted in chapter two, the EGTT was largely an advisory body, which at best, focused on refining the TNA structure.

⁴ Contrariwise, Ahmed Abdel Latif seems to suggest that developing States insisted on the name ‘technology transfer’ mechanism as against the position of developed States for a ‘technology mechanism’. This appears incorrect, considering the initial proposal by the G-77, which clearly proposed a ‘technology mechanism’. See Ahmed Abdel Latif, “The Climate Technology Mechanism: Issues and Challenges” (2011) Information Note Number 18 ICTSD 2.

An enhanced institutional mechanism will address all aspects of cooperation on technology research, development, diffusion and transfer in accordance with Articles 4.1(c), 4.3, 4.5 and other relevant articles of the Convention, in order to enable mitigation and adaptation under the relevant paragraphs of decision 1/CP.13.⁵

This affirms the position taken in chapter three that the ultimate criterion through which any transfer programme should be measured is how ‘enabling’ such a programme is. Although this objective was neither reproduced in the 2010 Cancun Agreement through which the TM was established, nor in Article 10 of the PA, it is contended that the objective of ‘enablement’ remains the key criterion for the EST transfer regime. As argued in chapter two, regardless of Article 10 of the PA, Article 4(5) of the Convention (which grounds the ‘enablement’ objective) remains a vital subsisting pillar on which the present EST regime rests.⁶ In subsequent sections, Article 10 of the PA will be considered critically, the essential components of the technology mechanism and framework will be reviewed, and the intersect of the mechanism with affiliate mechanisms – capacity building and finance – will be appraised. The chapter will conclude with a comparison of TM, CDM and the Poznan Strategy.

4.1 Understanding the Technology Mechanism and Framework

The TM was established in 2010 in Cancun. Five years later, the Technology Framework (TF) was established to “provide overarching guidance to the work of the Technology Mechanism ... in order to support the implementation of the Agreement”.⁷ The Framework is to be elaborated upon by the Subsidiary Body for Scientific and Technological Advice (SBSTA).⁸ As the process to elaborate is still ongoing, the most current draft of the TF will be considered in this work.⁹ A line should, however, be drawn between the TF and the pre-existing Technology Transfer Framework (TTF) which was established at COP 7 in Marrakesh in 2001.¹⁰ It is worth recalling that five themes were identified for “meaningful and effective actions” under the TTF: TNAs; technology information; enabling environments; capacity building; and mechanisms for technology transfer.¹¹ It has been suggested that

⁵ *Supra* note 1.

⁶ Further, although the technology mechanism was incorporated into the PA (See Article 4(3) of the PA), the Mechanism was (originally) made further to Article 4(1), (3), (5), (7), (8) and (9) of the Convention.

⁷ Paris Agreement, art. 10(4).

⁸ *Adoption of the Paris Agreement*, Dec. 1/CP. 21, UNFCCCOR, 2015, FCCC/CP/2015/L.9/Rev. 1, 68.

⁹ *Initial Draft of the Technology Framework*, SBSTA, 48th Sess., SBSTA48.Informal 1 (2018).

¹⁰ *Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4, paragraph 5, of the Convention*, Dec. 4/CP. 7, UNFCCCOR, 2001, FCCC/CP/2001/13/Add. 1 (Annex)

¹¹ *Ibid.*

the TF “should add value to the TFF” and should “continue to act as a lighthouse to the” TM.¹² This represents that the TFF remains a stand-alone Framework. Perhaps, a better way to represent the status of the TFF is to recognise it not as a ‘Framework’, but as part of the terms of reference of the Technology Executive Committee (TEC).¹³ It is important to further clarify that the TF is not expected to be another institution, but a ‘document’ providing ‘overarching guidance’ in the bid to implement the TM.¹⁴ Both the mechanism and Framework (in draft) will be considered later in this work. It is, however, imperative to consider carefully Article 10 of the Paris Agreement, through which the TM was adopted, and the TF was created. More so as the PA provides perspective on how far the world has come in respect to technology development and transfer, compared to the 1992 UNFCCC.

4.1.1 Article 10 of the Paris Agreement: A Critique

Without prejudice to the argument made in chapter two that applying the *systematic integration principle*, both Article 4(5) of the Convention and Article 10 of the PA should be read together, it is worth probing the implications of Article 10, particularly for African States, when read alone. Two points are particularly worthy of highlight: the absence of clear designation of obligation and lack of specificity on the source of funding. While the seeming breakaway from the traditional developed-developing State divide has been applauded in some quarters as positive,¹⁵ the underpinning rationale is fundamentally flawed. One writer described the political atmosphere in which the TM *qua* PA (article 10) was negotiated thus:

...industrialized countries, particularly the US, became wary of concessions in the technology discussions which could adversely impact their competitiveness. These concerns, in particular regarding China’s growing technological capacities and ‘indigenous innovation’ policies, cast a shadow over the global negotiations on the transfer of clean energy technologies in the run up to Cancun.¹⁶

¹² *The Republic of Korea Submission on the Technology Framework under Article 10, Paragraph 4 of the Paris Agreement*, Paper no. 8: Republic of Korea in *Elaboration of the Technology Framework*, SBSTA, 45th Sess., FCCC/SBSTA/2016.MISC.4 (2016), 20 at 20 – 26.

¹³ See *The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention*, Dec. 1/CP.16, UNFCCCOR, 2010, FCCC/CP/2010/7/Add.1, para. 119 which provides that “...the (TEC) shall further implement the framework for meaningful and effective actions to enhance the implementation of Article 4, paragraph 5, of the Convention adopted by decision 4/CP. 7 and enhanced by decision 3/CP. 13.”

¹⁴ *Supra* note 7. See also *Supra* note 9 (annex).

¹⁵ Lavanya Rajamani & Emmanuel Guerin, “Central Concepts in the Paris Agreement and How they Evolved” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 84.

¹⁶ Abdel Latif, *supra* note 4 at 3.

Considering that only a handful of developing States can claim similar strong economic status like China, India and Brazil and, consequently, that most developing States lack the ability to compete with developed States and their already established companies, it is difficult to see the merit in the argument of developed States.¹⁷ In a market-controlled global EST industry, it can hardly be argued that the apprehension of developed States is unjustified. But it is improper to make this a basis for complete abrogation of responsibilities. The point being made here should not be confused for being oppositional to the more nuanced approach to differentiation pertaining to emission reduction commitments under Articles 2(2) and 3 of the PA. On the contrary, the point is that with such heightened responsibilities for developing states should come increased support. The failure to specify such support in Article 10 hardly affirms this level of support. It is interesting to point out that although there is no clear link between their responsibility vis-à-vis developed States' obligation of technological support like it was under the Convention, virtually all African States have proceeded to premise their nationally determined contributions (NDCs) on effective technology support and transfer.¹⁸ For instance, Egypt noted in its NDC "locally-appropriate technology transfer and financial flows from industrialized countries (Annex 1 countries) to support carbon emission abatement according to the UNFCCC principles, which acknowledges that developed countries should provide required support to developing countries in this regard".¹⁹ What this suggests is that although developed states' might have successfully avoided the explicit inclusion of the transfer commitment in the Paris Agreement, African and other developing States presume the existence of such responsibility.²⁰ Article 10 of the PA regardless, it appears the UNFCCC EST transfer regime is in a

¹⁷ Making a similar point, it was noted elsewhere that rather than committing themselves to building the technological capacities of developing states, developed companies emphasise the market conditions of developed states because "...building capacities has the effect that local competitors are strengthened – something developing states favour". See Coninck & Sagar, *supra* note 2 at 262.

¹⁸ See for examples, Nigeria, Kenya and South Africa NDCs, online: <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Nigeria%20First/Approved%20Nigeria's%20INDC_271115.pdf>; <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Kenya%20First/Kenya_NDC_20150723.pdf>; <<http://www4.unfccc.int/ndcregistry/PublishedDocuments/South%20Africa%20First/South%20Africa.pdf>>; and <<http://www4.unfccc.int/ndcregistry/PublishedDocuments/Egypt%20First/Egyptian%20INDC.pdf>>

¹⁹ Arab Republic of Egypt, "Egyptian Intended Nationally Determined Contribution" online: <<http://www4.unfccc.int/ndcregistry/Pages/Search.aspx?k=egypt>>

²⁰ See also India's NDC which states that "[t]he successful implementation of INDC is contingent upon an ambitious global agreement including additional means of implementation to be provided by developed country parties, technology transfer and capacity building following Article 3.1 and 4.7 of the Convention". "India's Intended Nationally Determined Contribution: Working Towards Climate Justice" online: <<http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>>

state of flux. This is a confusing state where developed States construe themselves as having no mandatory obligation to transfer, while developing States presume otherwise.

A direct corollary from the foregoing fluid situation is the lack of specificity of the source of funding for technology transfer. Article 10(6) of the PA provides that “support, including financial support, shall be provided to developing country parties for the implementation of this Article...” But by whom and through what means will such provision be made? It is arguable that a joint reading of Article 10(6) with Article 9(1) of the PA answers this question. However, this, again, is doubtful. Article 9(1) provides that “developed country parties shall provide financial resources to assist developing country parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention”. It has been suggested that with the qualifying phrase – “...in continuation of their existing obligations...”, Article 9(1) does not create additional responsibilities for developed States.²¹ More concretely, it can be assumed that the reference to ‘existing obligations’ means the previously agreed ‘USD 100 billion per year by 2020’ agreed to by developed States at COP 15 in 2009.²² The ‘additional’ expectation set in paragraph 53 of Dec 1/CP.21 is for the COP to set “a new collective quantified goal from a floor of USD 100 billion per year” prior to 2025. Unsurprisingly, the agreement did not state whether developed states (as presently understood) or a broader category as recognised in Article 9(2) will be responsible for this ‘new goal’. This might be the next frontier of dispute between developed and developing States in the coming years.

In any case, it is doubtful if Article 9(1) can be read into Article 10(6). It should be noted that the latter is pigeonholed to “...the implementation of this Article...” Hence, the financial support in Article 10(6) is limited to technology transfer *simpliciter*, unlike the generic nature of Article 9(1). While this distinction might have been insignificant in another context, it is consequential in the climate change discourse. It is noteworthy that, traditionally, developed States do not consider the financial mechanism as a ‘special purpose vehicle’ for technology transfer. This point was made elsewhere thus:

...how technology transfer mechanisms under the UNFCCC ought to be funded is a matter of continued disagreement. While developing countries generally argue for a stable funding situation, preferably through a hard link between the UNFCCC’s FM ... developed countries have been resisting their calls for this. They feel that the GCF should be autonomous in

²¹ Jorge Gastelumendi & Inka Gnitke, “Climate Finance (Article 9)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017)

²² *Copenhagen Accord*, Dec 2/CP. 15, UNFCCCOR, 2009, FCCC/CP/2009/11/Add. 1, para 8.

spending its funds efficiently on those actions that the experts within the GCF feel will generate most mitigation and adaptation benefits.²³

However, grouping technology transfer alongside other initiatives competing for general funding from the FM is inconsistent with the critical position occupied by ESTs in the climate change fight. The point is that while there is provision for finance under Article 10, no one is obligated to provide such funding. This should be contrasted with the original proposal by the G-77 for the establishment of a Multilateral Climate Technology Fund (MCTF) to be financed by “assessed contributions from Annex II parties”.²⁴ This proposal was made further to the dissatisfaction of developing states with the ineffectiveness of the FM doubling as the funding platform of the TM. As shown in chapter three, lack of or inadequate finance has been identified consistently by developing States in their TNAs over the years. There is, however, no marked difference under Article 10. As pointed out by Coninck and Sagar in their analysis of Article 10, “more than anything, it will require providing adequate support to developing countries to implement their plans for a climate-compatible future. Yet such support is not being provided through the UNFCCC, either in financial terms or in terms of implementation support”.²⁵

The decapacitating implications of the foregoing two points is already being felt by the institutions established under the TM – the Technology Executive Committee (TEC) and Climate Technology Centre and Network (CTCN). A 2017 independent review of the CTCN finds that:

...the voluntary-based funding model of the CTCN is not appropriate as it limits the implementation and fulfilment of its mandate. A lack of funding was reported as putting at risk the CTCN’s operations ... The voluntary aspect of the funding model results in a lack of predictability for the CTCN over the medium and even short term, thereby limiting its capacity to plan ahead for the expected levels of activity”.²⁶

More substantively, Article 10 introduces concepts that were previously not part of the Convention. Article 10(1) refers to parties sharing “long-term vision on the importance of fully realizing technology development and transfer”. In Article 10(4), the pursuit of ‘the long-term vision’ was made the objective of the technology mechanism and framework. The vision is, however, less than clear and inelegantly drafted. To be more coherent, the intervening phrase ‘on the importance’ needs to be

²³ Coninck & Sagar, *supra* note 2 at 263.

²⁴ *Supra* note 1 at 2 – 3.

²⁵ Coninck & Sagar, *supra* note 2 at 275.

²⁶ “Report on the Independent Review of the Effective Implementation of the Climate Technology Centre and Network”, FCCC/CP/2017/3, 14

expunged, leaving “long term vision of fully realizing technology development and transfer”. But this is still unhelpful. Aside that the qualifier ‘long-term’ is non-descript, what is meant by ‘fully realizing technology development and transfer’ is also vague.²⁷ Also worth noting is the copious reference that the draft technology framework makes to this vague ‘long-term vision’.²⁸ Presumably, while ‘long-term’ speaks to ‘timeline’, full realization refers to ‘level’ of transfer. Clarifying both the level of transfer aimed for and the timeline within which such should be done is crucial, firstly for measurability, and secondly, as will be shown later, because of the connection between EST development and transfer and the overall objective of the PA.

One way to interpret the phrase ‘long-term’ in Article 10 is to align its usage to the application of the term elsewhere in the Agreement. Article 2(2)(a) puts the global average temperature aspiration at “well below 2°C above pre-industrial levels” with further commitment to pursue a 1.5°C temperature increase limit. Article 4(1) refers to these targets as ‘long-term temperature goal’, and further projects that “the balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases” should be achieved “in the second half of this century”. Read together, these provisions speak to both timeline (2050) and emission limit (1.5°C – 2°C). Since ESTs are, essentially, instrumental to the attainment of Article 2(2)(a) within the timeline contained in Article 4(1), it is not farfetched to argue that the provision ‘long term vision (of)...fully realizing technology development and transfer’ refers to the development and transfer of technology adequate to meet the 1.5°C – 2°C target before 2050.²⁹

Support for the above argument can be gleaned from the EGTT strategy paper for the long-term perspective beyond 2012 on technology development and transfer under the Convention.³⁰ The

²⁷ It was noted elsewhere that “‘Fully realizing’ TD & T is language not previously used. As of yet, it is unclear what it means to have fully realized... The phrase probably needs to be interpreted as a way to insert more goal-oriented language in the technology Article but indicators for full realization remain to be agreed”. Coninck & Sagar, *supra* note 2 at 264.

²⁸ *Supra* note 9 at 4.

²⁹ A critique of this argument, however, is that it only pertains to mitigation technology, since the Articles 2(2)(a) and 4(1) only pertain to emission mitigation. It is more difficult to define what it means to have a long-term goal for fully realizing adaptation technology development and transfer, since the unmitigated effects of climate change, whether in terms of adaptation or loss and damages, are still unfolding and cannot be conclusively predicted. However, Article 7(1) of the Agreement partially provides a response to this critique. It provides that “parties hereby establish the global goal on adaptation ... with a view to ... ensuring adequate adaptation response in the context of the temperature goal referred to in Article 2”. Hence, it is arguable that the adaptation technological needs can also be gauged using the 1.5°C – 2°C threshold.

³⁰ *Strategy Paper for the Long-term Perspective Beyond 2012, including Sectoral Approaches, to Facilitate the Development, Deployment, Diffusion and Transfer of Technologies under the Convention – Report by the Chair of the Expert Group on Technology Transfer, SBI & SBSTA, 30th Sess., FCCC/SB/2009/3 (2009).* (Strategy Paper)

Strategy Paper drew from the Stern Review, which was based on a technology-based analysis, and concluded that for total GHG emission to be stabilised at 550 parts per million (ppm) (necessary to keep the globe within the 1.5°C – 2°C range) by 2050, a total of \$1 trillion, which equals to about “1 ± 2½ % of annual GDP”, will be needed.³¹ While technologies needed transcend mitigation technologies – the focus of the Stern review, the EGTT’s reference to long-term technology transfer vision in the context of 2050 emission reduction targets provides clarity to how the phrase ‘long term vision ... (of) fully realizing technology development and transfer’ can be reasonably interpreted. Put together, ‘full realization of development and transfer’, in the context of Article 10(1), can be said to have been attained when the long-term emission reduction target set in Article 2 of the Agreement is achieved and the unmitigable effects of reaching that benchmark are addressed. This aspiration, while lofty and measurable, should be considered a base target. Ultimately, ‘full realization of development and transfer’ should be determined by an accessible and affordable global EST regime, where all States, particularly least developed countries, have access to ESTs necessary for their sustainable development and to facilitate their response to the adverse impacts of climate change.

Another point worth highlighting in Article 10 is the recognition of “cooperative approaches to research and development, and facilitating access to technology, in particular for early stages of the technology cycle, to developing country parties”.³² While it will be incorrect to classify this provision as novel since Chapter 34 of Agenda 21 admonished collaborative R&D,³³ this provision represents the first time such is stated in a binding MEA. Noticeably, specific reference was made to the ‘early stages of the technology cycle’. Such transfer has the prospects of involving developing states at the early stages of EST innovation, improving their technological capacities and their ability to develop locally relevant technologies. However, Article 10(5) is, at best, admonitory and non-mandatory. It imposes no obligation.³⁴ In effect, it is unclear if it is substantially different from the non-binding provisions of Chapter 34 of Agenda 21 which, arguably, contains more progressive provisions than Article 10. But the point must also be made that although it is desirable for parties to couch obligations in a manner that attests to their readiness to be bound, an agreement framed to be binding does not, in

³¹ Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007) 236.

³² Paris Agreement, art. 10(5).

³³ See Agenda 21, chap. 34.21.

³⁴ According to Coninck and Sagar, Article 10 of the PA only provides “a sense of direction rather than of action” and creates room for governments to use the PA’s vagueness and discretion “to limit the scope or intensity of their proposed actions”. *Supra* note 2 at 266.

itself, assure implementation. Article 4(5) of the UNFCCC, which is mandatorily couched but barely given effect to, evidences this.

Importantly, Article 10(6) of the Agreement, *inter alia*, provides that “the global stocktake ... shall take into account available information on efforts related to support on technology development and transfer for developing country parties”. No doubt, as hinted in chapter three, the unavailability of detailed account of transferred technology makes it difficult to measure technology transfer initiatives and ascertain claims of transfers. But this is not for want of provisions mandating such report. The problem has more to do with the compliance of States.³⁵ For example, of the national communications considered in chapter three (United States, European Union and Japan), virtually none of them contained all the components required by the UNFCCC Guidelines on reporting.³⁶ Again, as already being displayed in the ongoing negotiation on the periodic assessment of the TF, developed States prefer appraisal at the level of input indicators (i.e. transfer projects they claim to have embarked on), rather than the actual on-the field results of such projects.³⁷ However, if properly implemented, it is expected that the transparency framework and compliance mechanism under articles 13 and 15 of the PA, has the potential of correcting some of the flaws identified above. Further, it is anticipated that as the Ad Hoc Working Group on the Paris Agreement (APA) develops the modalities for the global stock take, the inadequacies of the previous set-up under the Convention will be addressed.

In all, while Article 10 of the Paris Agreement has an appearance of being a break from the *status quo*, it does not appear to have made any substantial addition to the climate regime on technology development and transfer. Article 10 is a drawback from the more compelling (though not perfect) provision of Article 4(5) of the Convention. Hence, it is reiterated that Article 10 of the PA must not be seen or taken as a substitute for Article 4(5) of the UNFCCC. At the very least, both provisions should be read and applied together. Nevertheless, whether read alone or together, the institutional arrangement for technology development and transfer under the climate regime remains the TM. It is

³⁵ For instance, Art. 12(1)(3) require developed States to communicate to the COP details of measures taken in respect of the promotion and funding of EST transfer.

³⁶ See *Review of the Implementation of Commitments and of other Provisions of the Convention: UNFCCC Guidelines on Reporting and Review*, UNFCCCOR, 5th Sess, FCCC/CP/1999/7 (2000) (UNFCCC Guidelines), 92

³⁷ As noted by Janice Meier, Coordinator of Technology Working Group, Climate Action Network, who participated in the recently concluded 2018 Climate Change Conference in Bonn, “We are fighting some parties who want to limit the assessment to the mandates of the TM and not on results of those mandates on the ground”, “The US and its allies ... want to check the boxes without really doing very much ...”. Janice Meier, Emails received on May 2 and August 4, 2018. See also Coninck & Sagar, *supra* note 2 at 272.

therefore necessary to look closer at the constitution and workings of the TM and the ongoing attempt to generate a framework to serve as its ‘overarching guide’. It is to this I now turn.

4.2 The Technology Mechanism and Framework: Institutions and Components

In the earlier parts of this thesis, various institutional arrangements for EST transfer under the UNFCCC were considered. These arrangements were, however, mostly ad-hoc. Considering that the EGTT anchored the technology transfer agenda of the UNFCCC prior to the establishment of the technology mechanism, a comparison of its make-up and the constituents of the TM could be helpful to better appreciate whether the TM, in truth, heralds a new phase in the UNFCCC transfer regime. It should be recalled that one of the hypotheses of this work (discussed in chapter two) is that the UNFCCC technology regime has essentially recycled the same institutional and operational designs from over the years. This, in part, accounts for the absence of substantial progress. Before this comparison, however, the institutional arrangements, successes and challenges of TEC and CTCN, which were established to “facilitate the effective implementation of the technology mechanism, under the guidance of the Conference of the Parties”,³⁸ are considered in the succeeding sub-sections. In the meantime, it bears recalling that the TM was established in 2010, but the TEC became operational in 2011, while the CTCN did not come onstream until 2013.³⁹ The reviews below cover TEC’s operations between 2011 – 2017 and CTCN’s operation between 2013 – 2017.

It is also noteworthy that the COP emphasised support for “action on mitigation and adaptation in order to achieve the full implementation of the Convention”. This is the objective of the enhanced action on technology development and transfer.⁴⁰ It is unclear if the “enhanced action” refers to the TM, such that the stated objective can be deemed the objective of the mechanism. The objective, however, refers to “the full implementation of the Convention”. Its reference to the Convention is understandable since its establishment predates the PA. But it can also be read as meaning the ‘full implementation of the Paris Agreement’, since the Agreement is meant to enhance “the implementation of the Convention”⁴¹ This view accords with the interpretation earlier given to Article 10(1) of the PA. In pursuit of the objective, the COP further stressed that “technology needs must be

³⁸ *The Cancun Agreements*, *supra* note 13 at paras 117 & 118.

³⁹ *Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2013*, SBSTA & SBI, 39th Sess, FCCC/SB/2013/1, para. 9.

⁴⁰ *The Cancun Agreements*, *supra* note 13 at para 113.

⁴¹ Paris Agreement, art. 2(1).

nationally determined, based on national circumstances and priorities”.⁴² As shown in previous chapters, the local determination of technological needs has been on the UNFCCC ‘radar’ since 1992.⁴³ Despite this, the non-alignment of transfer initiatives with actual local needs, as demonstrated in chapter three, has been recurrent in the different transfer pathways. A closer look at the structural arrangement of the TEC and the CTCN might provide clarity on whether this trend will recur under the mechanism. Further, the development of endogenous capacities; deployment and diffusion of ESTs and know-how; increased public and private investment; deployment of soft and hard technologies; improved climate change observation systems; strengthening of national systems of innovation; and development and implementation of technology plans, were identified as some of the TM’s priority areas.⁴⁴ Again, these are some of the areas identified in chapter 34 of Agenda 21. For example, the TM completely leaves out recommendations on transfer of publicly owned ESTs and the provision of incentives to stimulate companies to transfer ESTs.⁴⁵

4.2.1 The Technology Executive Council

The TEC is popularly described as the policy arm of the TM. It “focuses on identifying policies that can accelerate the development and transfer” of ESTs.⁴⁶ This is, however, only part of its terms of reference. While providing assistance on climate friendly policies is a key part of TEC’s mandate, it also has the responsibilities of promoting collaborations between governments, the private sector, non-profit organizations and academic and research communities; cooperate with other technology initiatives, stakeholders and organizations, “and promote coherence and cooperation across technology activities, including activities under and outside of the Convention”; and “catalyse the development and use of technology road maps or action plans”.⁴⁷ The mandate of the TEC (and CTCN) was further enlarged in 2015 to include: technology research, development and demonstration, and “the development and enhancement of endogenous capacities and technologies”.⁴⁸ This list

⁴² *The Cancun Agreements*, *supra* note 13 at para 114.

⁴³ For example chapter 34.14(d)(iii) admonishes support for endogenous capacity-building through ... “integrated sector assessments of technology needs, in accordance with countries’ plans, objectives and priorities as foreseen in the implementation of Agenda 21 at the national level”.

⁴⁴ *The Cancun Agreements*, *supra* note 13 at para 120.

⁴⁵ See Agenda 21, para 34.18 (a) & (e)(i)(iii).

⁴⁶ See “Technology Executive Committee: Strengthening Climate Technology Policies (Overview)” online: < <http://unfccc.int/ttclear/tec> >

⁴⁷ *The Cancun Agreements*, *supra* note 13 at para 121(d)(f)(g).

⁴⁸ See Dec 1/CP. 21, *supra* note 8 at para. 67.

borders more on implementation than policy making. As will be shown later, the CTCN has similar responsibilities. To an extent, this raises questions on the necessity of a dual structured TM. Importantly, TEC's mandate to "promote coherence ... across technology activities under and outside the Convention" is commendable given the disarray and uncoordinated state of the current global EST structure.

The TEC is comprised of twenty expert members elected by the COP, made up of nine Annex I parties, three members apiece from Africa, Asia and the Pacific, and Latin America and the Caribbean, and one member apiece from small island developing states and least developed countries.⁴⁹ Unlike the EGTT, the TEC has no position for non-state parties.⁵⁰ This seems inconsistent with the recognition of the vital role played by private companies, NGOs and other multilateral bodies in EST transfer. It appears more efficient to involve these non-state parties at the policy crafting stage, rather than merely seeking their participation to enforce such policies. It should, however, be noted that a new inclusion, as per the TEC, is the opening of TEC meetings to attendance by accredited observer organizations.⁵¹ It also allows the TEC to seek input from "intergovernmental and international organizations and the private sector and may seek input from civil society".⁵² While this is undoubtedly laudable, it falls short of the level of participation that will give these non-state parties an actual stake in the decision making process. More so, it is the prerogative of the TEC whether to allow the attendance of observers or the participation of non-State parties. The point here is the likelihood that if non-state parties, particularly private entities, are actively involved with the TEC in its policy works, it is more likely that they will be more open to complying.⁵³ There is, however, the risk that the involvement of private entities, which are more interested in profit-making, might be antithetical to the interest and position of developing States.

⁴⁹ "Composition and Mandate of the Technology Executive Committee" Appendix IV to the Cancun Agreement, *supra* note 13 at 30.

⁵⁰ Like the composition of the TEC, the EGTT was comprised of twenty members. Of the twenty members, three are from "relevant international organizations". See *supra* note 10 at 30.

⁵¹ "Composition and Mandate of the Technology Executive Committee", Appendix IV to the Cancun Agreements, *supra* note 47 at para 11.

⁵² *Ibid* at para 10.

⁵³ It can, however, be argued that having private companies as members of the TEC, while it will not only be complicated considering the diverse companies concerned, might encumber the TEC, as such companies will not unlikely refute proposals which are seen as against the economic interest of companies.

Although it had its first meeting in 2011, the first two years of the TEC's existence were focused on operationalization of the committee. In 2012, among other initiatives, the TEC published its modalities on linkages with other EST institutions and rolling workplan for 2012 - 2013.⁵⁴ The preference for a 'rolling workplan' is to "allow for flexibility and adjustments in response to guidance from the COP".⁵⁵ With the exception of relatively new issues like south-south and triangular cooperation and loss and damage which were referenced in its 2016 and 2017 reports to the COP,⁵⁶ the TEC's activities in the past years focused on organization of workshops, collaborative meetings and publication of briefs on issues bordering on TNAs, climate finance and national systems of innovation (NSI). In detailing its 'performance activities' in 2017, the TEC referred to the number of users and views of the TT:CLEAR (online) platform; its social media presence; stakeholders engaged in its events; countries receiving TNA assistance and number of publications.⁵⁷

What is apparent from TEC's list of achievement is that they are input-based (i.e., they deal with transfer initiatives and projects as designed and/or implemented). None of these indicate the actual impact in target countries. It is also difficult to appraise which countries benefited from TEC's advisories and programmes, as none of its reports to the COP contains this information. Again, TEC's workshops and publications are largely on generic subjects, with the implication of non-consideration of regional and national distinctness.⁵⁸ The relevance of local realities in policy formation can hardly be overemphasised. While it may be near impossible to conduct a state-by-state analysis of technology policy needs, there are cross-cutting themes and common realities in African countries that could validly inform region specific reviews. As it stands, it can be fairly concluded that the TEC's activities

⁵⁴ *Report on the Linkage Modalities and the Rolling Workplan of the Technology Executive Committee for 2013 – 2013 – Note by the Chair of the Technology Executive Committee*, SBSTA & SBI, 36th Sess, FCCC/SB/2012/1 (2012).

⁵⁵ *Ibid* at 6.

⁵⁶ See *Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2016*, SBSTA & SBI, 45th sess, FCCC/SB/2016/1 (2016); and *Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2017*, SBSTA & SBI, 47th sess, FCCC/SB/2017/3 (2017).

⁵⁷ Technology Executive Committee, "Technology Executive Committee: Performance Activities" (2017) online: <http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_tab_1/ce6da98b6eb048dc9a4458bb08ddd502/eb5fa42ab8224402ad9a035520d7aeb3.pdf>

⁵⁸ TEC has ten publications on subjects ranging from "Using Roadmapping to Facilitate the Planning and Implementation of Climate Technologies" (2013) online: <http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_column_L/3aaf07d4cf1d4d51998b57771759880a/f427db90b3c54f2d979f984db5af18ce.pdf> to "Industrial Energy Efficiency and Material Substitution in Carbon-Intensive Sectors" (2017) online: <http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_documents/4541b2b5ea704911b74bed9b17cd96dc/fded7988bc1740cc844cd3dd705a9336.pdf>. See generally <http://unfccc.int/ttclear/tec/documents.html> for TEC's publications.

are too general to be effective for States that need its (supposed) policy-making ‘expertise’ the most. Again, notably missing from TEC’s collaborative attempts is the involvement of the private sector. While collaboration has been referenced in all its reports since 2011, they have been in relation to UNFCCC bodies (CTCN, GEF, GCF, etc.) and a handful of multilateral institutions and NGOs. In none of the reports was an active engagement of the private sector referenced.

Again, although the provision of coherence in EST RD&D initiative is one of its mandates, there is nothing to indicate TEC’s progress in this aspect. As the lopsidedness of transfer initiatives to the detriment of African States will show, a coherent structure for transfer initiatives is crucial. This has the potential to provide a map of where initiatives are being implemented and where they are lacking. With such a map, State and non-State parties can work together to effectively and efficiently deploy transfer programmes.

After about six years of operation, the TEC, for the first time in 2017, reported its challenges to the COP. Some of these include the above identified flaws. It noted, in part, that it “recognises that a key challenge it faces is how to monitor and evaluate the impacts of its work”, and that “a key challenge remains in reaching out effectively to its target audiences, including policymakers, the private sector and international organizations”.⁵⁹ As hinted above, the TEC’s challenges are more deeply rooted than it has identified. It is important that its fairly long list of activities is not mistaken for actual impact. Despite its self-confessed shortcomings, it is unclear why the independent review conducted in 2017 was limited to the CTCN.

It is worth recalling that, at the very least, the standard through which TEC’s performance must be measured is whether it is fulfilling its mandate of “enhancing the implementation of Article 4 paragraph 5 of the Convention” and, by extension, Article 10 of the PA.⁶⁰ With TEC’s current modalities, it is difficult to answer this question in the positive. More so as it has no database showing how its initiatives have improved the policy making capacity of target countries.

4.2.2 The Climate Technology Centre and Network

The CTCN was established to “facilitate a network of national, regional, sectoral and international technology networks, organizations and initiatives with a view to engaging the participants of the Network effectively” to, at the request of developing States, provide support in identifying support

⁵⁹ 2017 Joint Annual Report, *supra* note 56 at paras 54 – 55.

⁶⁰ *The Cancun Agreements*, *supra* note 13 at para. 119.

needs, facilitate the provision of information, training and support for capacity building programmes to “make technology choices and operate, maintain and adapt technology”, and to facilitate prompt deployment of existing technology.⁶¹ Another key function of the CTCN is the facilitation and stimulation of the development and transfer of “existing and emerging” ESTs through collaboration with the “private sector, public institutions, academia and research institutions”.⁶² It is also established to provide in-country technical assistance and training, stimulate “the establishment of twinning centre arrangements to promote North-South, South-South and triangular partnerships” to encourage collaborative R&D, and help with the design of analytical tools and best practices for the dissemination of ESTs.⁶³ In a way, save for the non-reference of facilitation of transfer of publicly owned technologies, the CTCN’s terms of reference are the closest the UNFCCC has come to the Agenda 21 standard. In its design, the CTCN substantially responds to developing States’ previous complaints about the non-implementation role played by previous arrangements, particularly, the EGTT. However, beyond the terms of reference are the actual operations of the CTCN.

The CTCN is made up of a centre (CTC) and a network of organizations through which it provides technical assistance.⁶⁴ The centre is hosted by United Nations Environment Programme (UNEP) in partnership with United Nations Industrial Development Organization (UNIDO) with experts drawn from eleven consortium partners making up a technical resource pool (TRP).⁶⁵ The CTCN is accountable to the COP through an Advisory Board.⁶⁶ Importantly, the CTCN operates on the request of developing States. Developing States are expected to make their requests through National Designated Entities (NDEs).⁶⁷ By its five year (2013 - 2017) rolling plan released in 2013, the CTCN projects, by 2017, to have facilitated the investment of \$0.6 billion in ESTs, assisted with 50 – 75

⁶¹ *Ibid* at para. 123 (a)(i) – (iii).

⁶² *Ibid* at para. 123(b)(c).

⁶³ *Ibid* at para 123(c)(iii) – (v).

⁶⁴ See CTCN, “Draft Programme of Work” online: < <https://www.ctc-n.org/sites/www.ctc-n.org/files/f2137b4434244bdeafe3a24bad2c5273.pdf> >. The CTCN presently has 425 network members. See online: < <https://www.ctc-n.org/> >.

⁶⁵ CTCN, *Ibid* at 13.

⁶⁶ The Board is made up of 25 members and has the responsibilities of prioritising requests from developing countries, approving reports and criteria for prioritizing requests and membership of the Network, and “monitors, assesses and evaluates the performance of the CTCN”. See *Ibid* at 13.

⁶⁷ NDEs serve as CTCN’s focal points in developing States, manage proposal articulation and submission processes, identify priority technology needs, design collaborative programmes with the CTCN, facilitate consultative process between public actors and private sector and provide feedback on CTCN’s assistance and procedures. See *Ibid* at 12 – 13.

national and sectoral technology plans, and facilitated 100 new country-driven technology projects.⁶⁸ To achieve this target, the Centre identifies the following as success factors: sufficient long-term funding for the CTCN, sufficient demand for CTCN's services, ability of NDEs to carry out their functions and cooperation within the CTCN.⁶⁹ The process of the centre entails: a request to the centre; determination whether the request is consistent with (prioritization) criteria approved by the Board;⁷⁰ determination of whether request can be handled by the CTC staff or requires elaborate support through a 'quick support' by the TRP or 'larger response' by a network member.⁷¹ After response is delivered, a review of the assistance and its impacts is conducted and analysis and sharing of the experience is done and communicated through the Knowledge Management System (KMS).⁷²

The consideration of the CTCN's organization and operation bring to the fore the comprehensiveness and complexity of its set-up. While the establishment of the CTCN is laudable, there are a few downsides. One is that the sophistication of the organization could potentially discourage LDCs, most of which are in Africa. The prioritization criteria also, aside from being unclear whether they are to be taken conjunctively or disjunctively, might also potentially either discourage LDCs (and many developing States) or make their proposals ineligible for support, or eligible but unprioritized. For example, some of the criteria are that the project must demonstrate 'project readiness' and potential for replication or scaling up, promote multi-country approach and leverage public and/or private financing.⁷³ While 'Project readiness' is undefined, it is not unlikely that prioritized projects for some States are not considered priorities in other States, and LDCs are not financially viable to leverage public funds or attract private financing.

⁶⁸ *Ibid* at 24.

⁶⁹ *Ibid* at 36.

⁷⁰ The prioritization criteria includes that the proposed project promotes "endogenous and most appropriate technologies and processes; demonstrate 'project readiness' and the potential for replication or scaling up nationally, regionally and internationally; promote collaboration among between stakeholders; promote multi-country approaches and regional bundling of requests; leverage public and/or private financing; promote and demonstrate multiple benefits, as well as social, economic and environmental sustainability; and promote and demonstrate gender equality, and empowerment of vulnerable groups, including women and youths". See CTCN, "Climate Technology Centre and Network – Prioritization Criteria for Responding to Requests from Developing Country Parties" online: < <https://www.ctc-n.org/sites/www.ctc-n.org/files/240bcf259a814482a6b0b3d0f73932a4.pdf> >.

⁷¹ *Supra* note 64 at 20, 26.

⁷² *Ibid* at 26, 21 – 22.

⁷³ *Supra* note 70.

Between 2014 and September 2017, the requests for technical assistance to the CTCN skyrocketed from 24 to 190.⁷⁴ Eighty-three of these requests were from African countries.⁷⁵ However, of the 190 requests, 24 were successfully completed, 48 were under implementation, 31 were being designed.⁷⁶ These leaves about 87 projects under review or inactive. However, the distribution of successfully completed or projects under implementation is unknown; the CTCN has not included the information in its report to the COP. The technology transfer impact of its initiatives is also unclear from the report. Nevertheless, considering its financial limitations, the CTCN's performance, thus far, is generally commendable.

If 'enablement' of developing States is the key performance criterion for transfer initiatives, as argued in this work, the CTCN institutional and operational structure is questionable. It is worth recalling that both by its original mandate and COP 21's reiteration, collaborative RD & D and "the development and enhancement of endogenous capacities and technologies", are key responsibilities of the CTCN. The current set-up, however, emphasises a project-by-project implementation approach. Neither in its programmes of work or its reports to the COP, did the CTCN refer to any actual or proposed collaborative RD & D initiative. This, again, reflects in the CTCN's Network concept. As designed, network members are existing organizations with "demonstrated capability in initiatives aimed at development, transfer and deployment of climate technologies applicable for developing countries".⁷⁷ Clearly, while such an arrangement favours developed States with private and public institutions that have the required competencies, it disfavours developing States, particularly in Africa, with limited technical capacities. It is, therefore, not surprising that of the 425 network members, only 38 are in Africa. The CTCN noted this imbalance in its 2015 report to the COP, but it concluded by stating that "...the reach of the Network in Africa was comparable with other regions since many institutions, although not based in Africa, were providing their services to African countries".⁷⁸ This conclusion misses the mark. Ultimately, the technology mechanism is not about provision of project-level services but enabling States to provide their own solutions. It is interesting that the CTCN's Network

⁷⁴ 2017 Joint Annual Report, *supra* note 56 at para 93.

⁷⁵ *Ibid* at para 95.

⁷⁶ *Ibid* at para. 93.

⁷⁷ CTCN, "Guiding Principles and Criteria for Establishment of the Climate Technology Network" online: <<https://www.ctc-n.org/sites/www.ctc-n.org/files/fb910bb9b3394dff99a2be617f244ec4.pdf>>

⁷⁸ *Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2015*, SBSTA & SBI, 43rd sess, FCCC/SB/2015/1 (2015) 15.

is dominated by private sector organizations.⁷⁹ While the involvement of private entities is positive, the risk of the over-commercialization of CTCN’s services is not farfetched.⁸⁰ As noted in the CTCN’s independent review, “some Network members are dissatisfied with the commercial opportunities and networking activities provided by the CTCN. During the review, several interviewees questioned the sustainability of and value added by the Network if its level of engagement is not increased”.⁸¹

Whether the TEC and CTCN should not be just one body under the TM is a question that has not been answered. From the foregoing appraisal, the need for this institutional split is doubtful. The CTCN appears to do all that the TEC does, and more. For example, both bodies are involved in TNAs and in providing support for policy making. Invariably, this raises the possibility of initiative duplication. An example is the TT:CLEAR platform run by the TEC, and the Knowledge Management System run by the CTCN which, like the TT:CLEAR “disseminates and captures information on technologies and best practices”.⁸² It should be recalled that when initially proposed, the G77 conceived of a TM made up of two bodies – the Executive Body on Technology (ECB) and the Multilateral Climate Technology Fund (MCTF).⁸³ The ECB would have, to some extent, played the joint role being played by the TEC and CTCN.⁸⁴

While the TEC clearly imitates the EGTT, there are clear structural and operational distinctions between the EGTT and the CTCN. When considered from the perspective of how enabling both the EGTT and CTCN are, however, there seems to not be much difference between them.

4.2.3 The Technology Framework

As noted earlier, the TF emanates directly from the Paris Agreement, and it is expected to provide “overarching guidance” to the TM.⁸⁵ In 2017, the SBSTA agreed that the guiding principles of the TF are “coherence, inclusiveness, result-oriented approach, transformational approach and

⁷⁹ The network has 184 private organizations, with research and academic institution coming a distant second at 95. See <<https://www.ctc-n.org/network/network-members>>

⁸⁰ One of the guiding principles of the CTN is that network members “provide value for money”. CTCN, *supra* note 77.

⁸¹ *Supra* note 26 at para 71.

⁸² *Supra* note 65 at 21.

⁸³ *Supra* note 1.

⁸⁴ The proposed ECB was to be made up of a Strategic Planning Committee, Technical Panels, Verification Group and the Secretariat. *Ibid.*

⁸⁵ Paris Agreement, art. 10(4).

transparency”.⁸⁶ It had previously agreed that innovation; implementation; enabling environments and capacity-building; collaboration and stakeholder engagement; and support, should be the framework’s key themes.⁸⁷ Principles worthy of highlight are result oriented and transformational approaches, and the thematic areas of innovation and implementation. These are consistent with the ‘enablement’ concept advanced in chapter three of this work. The initial draft of the TF considers the result-oriented approach “in terms of output, outcome and impact”.⁸⁸ Implementation was also described by the Framework’s co-facilitators as meaning “to carry out work on the ground, helping economic growth, and sustainable energy pathway, not focusing on barriers, capacity building etc.”⁸⁹ It is worth noting that the draft TF does not contain this far-reaching definition of ‘implementation’.⁹⁰ Given that successive transfer pathways have been more input oriented, and that preceding programmes had emphasised barriers and capacity building with little effect, the exclusion of this understanding of ‘implementation’ from the Framework is a potential drawback, and only rehashes recurrent trends. It is unclear what would be the status of the TF vis-à-vis the original mandates of the TEC and CTCN and their current operating modalities. This is more so as the thematic areas focused on by both bodies are not same as the focal themes in the TF.⁹¹ To give effect to the proposed TF’s thematic areas, the organizational and operational structure of both the TEC and CTCN must necessarily be altered. For instance, it was argued above that the current CTCN arrangement, while effective in conceiving and implementing one-off projects, is not designed to facilitate collaborative RD&D and actual ‘enablement’ of developing States. A likely resolution of any conflict between the initial mandates of

⁸⁶ *Report of the Subsidiary Body for Scientific and Technological Advice on its forty-sixth session, held in Bonn from 8 to 18 May 2017*, SBSTA, 46th sess, FCCC/SBSTA/2017/4, para 31.

⁸⁷ *Report of the Subsidiary Body for Scientific and Technological Advice on its forty-fifth session, held in Marrakech from 7 to 15 November 2016*, SBSTA, 45th sess, FCCC/SBSTA/2016/4, para 29.

⁸⁸ *Supra* note 9 at 4.

⁸⁹ *Informal Note by the Co-Facilitators*, (2017) online: < http://unfccc.int/files/meetings/bonn_nov_2017/in-session/application/pdf/sbsta47_6b_informal_note_v2.pdf>

⁹⁰ Instead, the TF states that the implementation theme “should facilitate the delivery of the on-the-ground implementation of mitigation and adaptation actions...” See *Supra* note 9 at para 15.

⁹¹ TEC’s thematic areas are: adaptation; climate technology financing; emerging and cross-cutting issues; innovation and RD & D; mitigation; and TNAs, while the CTCN’s core services – provision of technical assistance; creation of access to information and knowledge on ESTs; fostering of collaboration among climate technology stakeholders – are channeled towards addressing barriers and creation of enabling environment. See < <https://www.ctc-n.org/about-ctcn>>. It is worth observing that the conception of ‘implementation’ by the co-facilitators, particularly in respect of the TM not being fixated on barriers is directly contradicted by the current emphasis of the CTCN.

the TEC and CTCN, and the provisions of the TF, will likely be in favour of the latter. This position seems supported by the use of the term ‘overarching guidance’ in Article 10(4) of the PA.⁹²

It is also important to note the TF’s requirement that TNAs should be aligned to NDCs and national adaptation plans (NAPs) “to ensure coherence between the implementation of these national plans and strategies to achieve climate-resilient and low-emission development”. In what appears to be a first since Agenda 21, the TF, under the enabling environment theme, recognises the need to enable access to ESTs in the private sector through incentives to technology providers.⁹³ But unlike Agenda 21, there is no specific mention of the party responsible for the provision of such incentives.⁹⁴

Further, in expounding on Article 10(6) of the PA, the draft TF notes that “the understanding of support under this key theme (support) is broader than just financial support, as it may include all aspects of support to implement Article 10 of the Paris Agreement”.⁹⁵ Such support is expected to be “new and additional, adequate and predictable in a transparent manner and provided (sic) for all the key themes of (the) framework, taking into account national circumstances, gender perspective and endogenous and indigenous aspects”.⁹⁶ While the requirement for ‘predictable’ support is, possibly, a response to the CTCN’s complaint on lack of predictable source of funding, the terms ‘new, additional and adequate’ are not defined. Particularly, the concept of ‘adequate’ support is devoid of meaning, except if read in the context in which Article 10(1) has been interpreted above.

Despite the valid point made in the TF that support transcends ‘financial support’, funding still represents the most essential form of support needed for the success of the TM. Developing States have, therefore, unsuccessfully clamoured for a hard link between the TM and FM over time. For instance, India, in its submission to the SBSTA on the TF, contended that “access (IPR) and affordability (finance) are the two key issues limiting transfer of technology ... addressing the access and affordability challenge requires establishment of a strong linkage between the financial

⁹² The word ‘overarching’ is defined to mean “most important, because of including or affecting all other areas”. See Cambridge Advanced Learner’s Dictionary & Thesaurus, online: <<https://dictionary.cambridge.org/dictionary/english/overarching>>.

⁹³ *Supra* note 9 at para 28.

⁹⁴ Chapter 34.18(e)(i) of Agenda 21 recognises that the “creation and enhancement of developed countries, as well as other countries which might be in a position to do so, of appropriate incentives, fiscal or otherwise., to stimulate the transfer of environmentally sound technology by companies, in particular to developing countries, as integral to sustainable development”.

⁹⁵ *Supra* note 9 at para 40.

⁹⁶ *Ibid.*

mechanism and technology mechanism”.⁹⁷ While the draft TF referred to the “enhancement of the linkages” between the TM and FM, it gave no direction on how this knotty issue can be resolved.

In all, while the draft TF still has several weak points, it will, no doubt, make up for some of the gaps in the TM. If properly effected, the TF has the prospect of making the TM more ‘enabling’.

4.3 Capacity Building and Technology Transfer under the Paris Agreement

In chapter two, the argument was made that the EST transfer regime has false structural baselines, which attest to the normative falsities of will and motive. One of the examples of these false baselines are the division and duplication of functions under the climate regime. Worse still, the divided bodies often operate in silos. The different operational structures for capacity building and technology transfer under the Paris Agreement further evidences this. Under the Agreement, capacity building is separately provided in Article 11. According to the PA, “capacity building under the Agreement should enhance the capacity and ability of developing country parties ... to take effective climate change actions, including, inter alia, to implement adaptation and mitigation actions, and should facilitate technology development, dissemination and deployment...”.⁹⁸ The difference between Article 10 (technology transfer) and Article 11 (capacity building) are, at best, superficial. In intent and purpose, they are the same. Strangely, they were negotiated by different negotiating groups at the Paris Conference. It should, however, be recalled that although the separate handling of capacity building precedes the PA,⁹⁹ it was considered jointly with technology transfer under the Convention.¹⁰⁰

Though two bodies were created under the TM – the TEC and CTCN - COP 21 established a new body, the Paris Committee on Capacity Building (PCCB) to “address gaps and needs, both current and emerging, in implementing capacity-building in developing country parties and further enhancing capacity-building efforts”.¹⁰¹ It should also be pointed out that the PA further provided separately for ‘education, training, public awareness, participation and access to information’ under Article 12, although without an explicit institutional arrangement. As noted elsewhere, parties had not agreed on

⁹⁷ India, *Views from the Government of India on SBSTA Agenda Item No 4: Technology Framework under 10(4) of the Paris Agreement*, SBSTA, 45th Sess., FCCC/SBSTA/2016.MISC.4 (2016), 12.

⁹⁸ Paris Agreement, art 11(1).

⁹⁹ Crispin d’Auvergne & Matti Nummelin, “Capacity-building (Article 11)”, in Klein et al, *supra* note 2 at 278 – 279.

¹⁰⁰ UNFCCC, art 4(5).

¹⁰¹ *Supra* note 8 at para 72.

the need for a separate institutional arrangement for capacity-building; in fact, some preferred that it be carried out under the existing institutional arrangements.¹⁰² The PCCB was proposed by the African Group (AG) in 2014 arguing that capacity building is “cross-cutting in nature, as such requires a more coordinated approach with a view of strengthening both the ability and effectiveness of specific adaptation and mitigation actions”.¹⁰³ One possible explanation for insistence on a separate institutional arrangement is the disillusionment of the AG (and G77) with the watering down of the proposed TM. Another explanation is the expressed need for the early and heightened capacity development the developing States seek before the operational phase of the PA in 2020, so that “capacity gaps ... do not become a barrier”.¹⁰⁴ It is, however, doubtful if the PCCB is fulfilling this mandate, or if it is even positioned to do so. In its 2017 report to the SBI, the Committee pointed out that “the challenge is that the PCCB is not in a position to work at the country level and is therefore limited to desk-based work”.¹⁰⁵ This, again, exposes a recurrent trend in the climate regime, particularly in North – South engagement; concessions to South-proposed initiatives by the North are not, in themselves, proof of support.

At the core of the concept of technology transfer is capacity-building. When technology transfer is appreciated as a blend of hardware, software and orgware, its sameness as capacity-building becomes evident.¹⁰⁶ A cursory review of the operations of both the TEC and the CTCN shows that they are capacity-building driven. Particularly, there is virtually no difference between the operations of the PCCB and that of the TEC. Apart from the duplicative implication of this split, is the inefficient application of limited funds.

¹⁰² *Supra* note 99 at 282 – 283.

¹⁰³ “African Group Intervention on Capacity Building to the ADP Contact Group – 10 June 2014”, online: < https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/adp2-5_statement_by_south_africa_on_capacity_building_20140610.pdf >

¹⁰⁴ *Ibid.* See also “Submission by the Group of G77 and China on the Paris Committee on Capacity-Building (PCCB)” online: < http://www4.unfccc.int/Submissions/Lists/OSPSubmissionUpload/653_259_131179168610475088-SUBMISSION%20BY%20GROUP%20OF%2077%20AND%20CHINA%20ON%20THE%20PCCB_FINAL.pdf >

¹⁰⁵ *Annual Technical Progress Report of the Paris Committee on Capacity-Building*, SBI, 47th sess, FCCC/SBI/2017/11 (2017) para 57.

¹⁰⁶ It has been noted elsewhere that capacity building, enabling environments and transfer mechanisms are the “three major dimensions of technology transfer” and that technology transfer must incorporate “capacity building at all relevant levels”. See GEF, “Transfer of Environmentally Sound Technologies: The GEF Experience” (2008) online: <https://www.thegef.org/sites/default/files/publications/GEF_TTbrochure_final-lores_3.pdf> 6, 11.

4.4 The Technology and Financial Mechanisms

A common denominator in the various phases and programmes of the UNFCCC EST development and transfer regime is the challenge of adequate funding. It was for this reason that the G77 proposed the establishment of the MCTF as part of the TM. This proposal was, however, not conceded by developed States. Neither was the proposal for a hard link between the TM and the financial mechanism (FM) welcomed.¹⁰⁷ Despite the absence of this link, the GEF indicates that it has a “mandate with significant guidance from the COP related to financing the transfer of ESTs in the context of both mitigation and adaptation”.¹⁰⁸

Although not established as a technology transfer specific fund, the Green Climate Fund (GCF) was established at Cancun in 2010 (same year as the TM) as an operating entity of the FM.¹⁰⁹ The GCF was established to “support projects, programmes, policies and other activities in developing country Parties using thematic funding windows”.¹¹⁰ Considering the several entities under the FM, with each having a direct or indirect EST development and transfer implication, the refusal of developed states to agree to a new entity is explicable. However, the failure to agree to a ‘hard link’ between the TM and FM is inexplicable. While the phrase ‘hard link’ is not defined, it can be construed as a formal and long-term allocation of a proportion of the resources available to the various operating mechanisms of the FM for the purpose of technology RD & D, transfer and diffusion in developing States.¹¹¹ As the Poznan strategy instructs, the link has both institutional and functional dimensions. This is further considered in chapter five.

The multiple entities under the FM and the creation of the GCF regardless, the need for a hard link between the FM and TM remains. The 2017 independent review of the CTCN evidences this. The report notes:

Financial resources provided by the GEF for CTCN operations have been based on ad hoc projects rather than sustained funding and therefore rather limited (USD 1.8 million). The GEF has developed and finances a network of regional climate technology centres hosted by MDBs ... and provide similar services ... the majority of interviewees indicated that the

¹⁰⁷ Coninck & Sagar, *supra* note 2 at 263

¹⁰⁸ GEF, “Elaboration of a Strategic Program to Scale Up the Level of Investment in the Transfer of Environmentally Sound Technologies”, (2008) GEF/C.34/5.Rev.1, 3 – 4.

¹⁰⁹ *The Cancun Agreements*, *supra* note 13 at para 102.

¹¹⁰ *Ibid.*

¹¹¹ Contrariwise, developed states have been said to have preference for the GCF (and by extension other FM entities) to be “autonomous in spending its funds efficiently on those actions that the experts within the GCF will generate more mitigation or adaptation benefits”. Coninck & Sagar, *supra* note 2 at 263.

voluntary-based funding model of the CTCN is not appropriate as it limits the implementation and fulfilment of its mandate. A lack of funding was reported as putting at risk the CTCN's operations ... The voluntary aspect of the funding model results in a lack of predictability for the CTCN over the medium and even short term, thereby limiting its capacity to plan ahead for the expected levels of activity.¹¹²

The Poznan Strategy, and the relative success it has recorded in facilitating technology transfer, proves how essential a hard link between the TM and FM is. Arguably, the achievement of Poznan is partly attributable to the location of the programme within the FM. The TEC has, since inception, made the attempt to re-enact a Poznan-like connection between technology planning and finance.

At COP 18, it was agreed that the linkage between the TM and FM would be elaborated on at COP 20 in 2014.¹¹³ At COP 20, the TEC submitted a paper on the subject of the linkage between the TM and FM.¹¹⁴ Here, the TEC recommended different ways it can make inputs into the decision-making process of the FM's operating entities and *vice versa*.¹¹⁵ In part, the TEC suggested that the operating entities of both mechanisms participate in the meetings, workshops and events of respective bodies,¹¹⁶ that the TEC evaluate the *Poznan Strategic Programme* "with the aim of enhancing the effectiveness of the Technology Mechanism",¹¹⁷ that it provides "policy advice on measures to create enabling environments for technology development and transfer in developing countries and an analysis of the barriers that hamper project/programme implementation".¹¹⁸ The TEC's recommendations were reflected in the provisions considered to be included in the PA. For example, the option below was considered:

The Technology Mechanism shall enhance cooperation and synergy with other institutional arrangements under and outside the Convention and stakeholders, as well as the coherence and effectiveness of technology action and initiatives under the Convention:

- Establish linkages between the Technology Mechanism, the Financial Mechanism and capacity-building institutions;
- The Poznan strategic programme on technology transfer to be linked to and/or guided by the Technology Mechanism...¹¹⁹

¹¹² *Supra* note 26 at para 53(d) & 55 – 56.

¹¹³ *Agreed Outcome Pursuant to the Bali Action Plan*, Dec 1/CP. 18, FCCC/CP/2012/8/Add.1, para. 62.

¹¹⁴ *Linkages between the Technology Mechanism and the Financial Mechanism of the Convention: Recommendations of the Technology Executive Committee*, COP, 20th Sess, FCCC/CP/2014/6

¹¹⁵ *Ibid* at paras 11 – 19.

¹¹⁶ *Ibid* at para 20(b).

¹¹⁷ *Ibid* at para 16(a).

¹¹⁸ *Ibid* at para 16(b).

¹¹⁹ *Elements for a Draft Negotiating Text*, FCCC/CP/2014/10/Add.1, para 57.2(b).

None of the above, however, made it into the Paris Agreement. The only reference to the FM in Article 10 is to support collaborative approaches to research and development. At COP 21, however, a decision recognising “the importance of and the need of defined, mutually beneficial and functional linkages between the technology mechanism and the financial mechanism” and inviting the Board of the GCF to “consider ways to provide support ... for facilitating access to environmentally sound technologies, and for undertaking collaborative research and development” was agreed to by parties.¹²⁰ At COP 23, some of the strides made in respect of the proposed link were highlighted, including the annual meetings between the GCF, TEC, CTCN and other constituted bodies under the Convention, and the invitation of the chairs of the TEC and Advisory Board of the CTCN to a meeting of the Board of the GCF “on issues of common interest in order to strengthen the existing linkages between the Technology Mechanism and the Financial Mechanism”.¹²¹ In specific reference to the CTCN, its “increased engagement” with the GCF by utilizing the GCF’s Readiness and Preparatory Support Programme and the Project Preparation Facility”, was noted.¹²²

While progress has been made in aligning the operations of the TM and FM, the initiatives taken have fallen short of the hard link needed between both mechanisms. The initiatives are not only *ad hoc* but, as in the case of the CTCN, the core issues in respect of finance are unresolved. The CTCN’s core need, according to its 2017 independent review, for instance, is a predictable and properly structured mode of funding which will allow for medium- and long-term planning.

Another matter to highlight is the seeming duplication of functions between the operating entities of both the TM and FM. A pointed example of this is the still subsisting *Poznan Strategy* under the GEF. Although it was proposed in 2014 that *Poznan* should be linked to the TM, the proposal failed. As a result, TNAs are conducted under the auspices of both the GEF, TEC and the CTCN. Again, while the CTCN is a core component of the TM, *Poznan* has distinctly established Climate Technology Centres and a Climate Technology Network.¹²³ Further, while the CTCN operates at the national level through National Designated Entities, the GCF has its own distinct National Designated Authorities

¹²⁰ *Linkages between the Technology Mechanism and the Financial Mechanism of the Convention*, COP, 21st Sess, Dec 13/CP.21, FCCC/CP/2015/10/Add.2, paras 5, 10.

¹²¹ *Linkages between the Technology Mechanism and the Financial Mechanism of the Convention*, COP, 22nd Sess, Dec 14/CP.22, FCCC/CP/2016/10/Add.2, paras 2 and 3.

¹²² *Ibid* at para 4.

¹²³ GEF, “Implementing the Poznan Strategy and Long-Term Programs on Technology Transfer” (2012) online: <https://www.thegef.org/sites/default/files/publications/GEF_PoznanTT_lowres_final_2.pdf> at 26 – 28.

(NDAs) in party states. It should be noted that one of the functions of the NDAs is to design, develop and propose projects to the GCF.¹²⁴ Among other things, this leads to a situation where the NDE under the CTCN set-up scopes for a ‘technology transfer’ project and proposes it to the CTCN, while the NDAs also design ‘climate friendly’ projects and recommend them to the GCF. The difference, however, is that NDA proposed projects are more likely to be implemented than NDE proposed projects due to ‘proximity’ to funds, although the NDA projects will likely be without deliberate technology transfer objectives.

The foregoing raises the question on whether a stand-alone TM was necessary, considering the relative success of the Poznan model and its continued existence under the FM. It should be recalled, again, that the 1992 Convention did not consider ‘finance’ and ‘technology transfer’ as two distinct subjects.¹²⁵ It is, indeed, difficult to conceive of a project financed by the UNFCCC which has no technology transfer prospect, even if it is only in its most basic form (hard ware transfer). The point here is that, it seems inefficient and ineffective to have a detached TM from the FM. While projects can be specifically designed for the purposes of transferring technology, a more effective appreciation of technology transfer is to engage it as a principle that underscores every project under the climate regime. In other words, ‘wholesome’ technology transfer should be considered as a fundamental objective for every project financed by the operating entities of the FM. Rather than proposing a stand-alone TM or accepting a TM without a financial component, developing States should have pressed for the consolidation of *Poznan* into a technology development and transfer component or sub-mechanism under the FM. Considering that the GCF is the key FM operating entity under the Paris Agreement regime, a consolidated *Poznan* would have been more efficiently situated under the GCF. By doing this, inefficient and ineffective proliferation of bodies under the UNFCCC would be done away with, and a pragmatic and concerted technology development and transfer mechanism would have been achieved. Again, as suggested in chapter three, an essential factor in allocating funds by the FM for projects should be how ‘enabling’ such project is. Proposed projects should be approved on how much they improve the capacity of the recipient State to further research, develop and adapt technologies. This is a vital lesson from China’s engagement with EST multinational companies that must be integrated into the FM funding processes.

¹²⁴ GCF, “Engaging with the Green Climate Fund” online: <https://www.greenclimate.fund/documents/20182/194568/GCF_ELEMENTS_01.pdf/542c1610-81b4-40df-be62-025cef3d26d8> 11.

¹²⁵ See UNFCCC, art 4 (3),(5) and (7).

4.5 The Technology Mechanism, Clean Development Mechanism and Poznan Strategy: A Comparison

Regardless of its defects and limited achievements, the TM (superficially) represents a marked departure from the previous *ad hoc* arrangements under the UNFCCC. However, the question that remains is whether the TM is more enabling than the transfer pathways considered in chapter three, particularly the CDM and the Poznan Strategy. As no specific project under the TM arrangement has been considered in this chapter, it is difficult to appraise the TM using the metrics employed in chapter three. Nevertheless, it is reiterated that the ultimate objective of any technology transfer programme must be to enable the recipient. The comparison attempted underneath is done with this ‘enablement’ objective in mind.

Table 5.

<i>S/N</i>	<i>Technology Mechanism</i>	<i>Poznan Strategy</i>	<i>CDM</i>
1.	Technology development and transfer specific.	Technology transfer specific.	Incidental technology transfer objective.
2.	Considerable market involvement.	Minimum market involvement.	Major market involvement.
<i>S/N</i>	<i>Technology Mechanism</i>	<i>Poznan Strategy</i>	<i>CDM</i>
3.	Strong connection between recipient’s technology needs and implemented projects.	Relative connection between technology needs and implemented projects.	Weak connection between technology needs and implemented projects.
4.	Inadequate funding.	Relatively adequate funding.	Relatively adequate funding.
5.	Relative connection between design and implementation.	Strong connection between design and implementation.	Strong connection between design and implementation.
6.	Even distribution of projects.	Lopsided distribution of projects.	Lopsided distribution of projects.
7.	Substantial involvement of local entities.	Partial involvement of local entities.	Low involvement of local entities.

In conclusion, the TM introduces a different institutional construct than what has been experienced under the UNFCCC. About eight years after the establishment of the mechanism and after over five years of its full operationalization, however, trends experienced under preceding transfer initiatives persist. Apart from the new institutional arrangement, in terms of implementation and results, the TM is not substantially different from previous arrangements. From the above table, for instance, it is obvious that there is no major difference between the TM and *Poznan*. If anything, although inhibited

by finance, *Poznan* represents a more concerted approach than the TM. However, the proposed Technology Framework under the PA, if endorsed and implemented by party States as currently designed, has the potential to drive positive advancement in the UNFCCC EST development and transfer regime.

Altogether, it is clear that the need of the global climate regime transcends merely establishing mechanisms or decisions by the COP or CMA. Primarily, there is an absence of will. The core needs of developing States in respect of ESTs are obvious, namely, the development of their national systems of innovations, particularly, their R&D infrastructure,¹²⁶ and the provision of adequate finance. While Article 10(5) of the PA admonishes support for collaborative RD&D initiatives, neither the TEC nor CTCN seem structured, equipped or funded to facilitate the implementation of this mandate. There is a ‘gap of will’ in the UNFCCC EST development and transfer regime. And this, more than anything else, is the most limiting flaw of the UNFCCC EST regime. As concluded elsewhere:

In the end, while the Paris Agreement takes a welcome step forward on the technology front, the enormous magnitude and timeframe of the challenge requires much more. However, the limited nature of the technology provisions is a reflection of a deeper undercurrent – the continuing lack of political will to support climate technology actions adequately and the lack of consensus on how to do it best. It is not enough to insert obligations into the text – their effectiveness and utility will depend on how seriously the parties translate them into action and build on these in the future.¹²⁷

The concluding chapter of this work will sketch an agenda for bridging the ‘gap of will’ which afflicts not just the UNFCCC EST regime, but also the global EST development and transfer regime.

¹²⁶ See Padmashree Gehl Sampath. “Can the Climate Technology Mechanism Deliver its Promise?” in Padmashree Sampath, J. Mugabe & J. Barton, *Realizing the Potential of the UNFCCC Technology Mechanism: Perspectives on the Way Forward* (Geneva: ICTSD, 2012) 5.

¹²⁷ Coninck & Sagar, *supra* note 2 at 276.

CHAPTER 5: CONCLUSION

...Let's not change the climate, let's change the system ... Let's talk about the cause, let's not evade responsibilities, and let's not evade the depth of this problem. The cause, undoubtedly, ... is the destructive metabolic system of capital and its embodied model: Capitalism.¹

The evolution of the UNFCCC EST regime, previous initiatives and pathways for EST transfer, and the current technology development and transfer regime as recognised under the Paris Agreement, have been considered in the preceding chapters of this thesis. As noted in chapter four, while there are visible distinctions between the present structure and previous programmes, there has been no marked difference at the core of the UNFCCC EST transfer regime. The regime has been replete with negotiations, resolutions and agreements. Yet the output has been largely the same. This was attributed to a 'gap of will' in chapter four. As argued all through this work, the concessions and consensus which have birthed the various phases of the UNFCCC EST regime have been at the super-structural level. Sub-structural issues pertaining to the normative core have not been dealt with: issues like what principles undergird the UNFCCC EST regime; what role human rights considerations play in EST development and transfer; and the modalities for treating ESTs as global public goods. Yet, these are the issues that have potential to determine the success or failure of the EST transfer initiatives. Rendered differently, negotiations can hold, and agreements can be reached on super-structural issues, but the effective performance of agreements reached depend on sub-structural normative concerns. It is by no means suggested that reaching a consensus on sub-structural issues will be easy. But discussing them is vital.

What is clear is that a dominant market (neoliberal) approach to ESTs is antithetical to the nature of climate change; it leaves third world people disempowered and disadvantaged.² But does this mean an outright and complete switch from a neoliberal approach? Considering that private entities, which are primarily profit driven, are the major innovators, developers, manufacturers and right-holders of ESTs, how can their interest be safeguarded in a non-neo-liberal dominant set-up? Should all ESTs

¹ Hugo-Chavez Frias, "Speech Delivered at COP 15, United Nations Climate Summit, Copenhagen" on 16 December 2009, online: <<http://www.voltairenet.org/article163361.html>>.

² In opposing what she described as 'climate capitalism', Adrian Parr stated that "I am fully aware of how it (climate capitalism) is gaining popularity among scholars and policymakers who hope to put the mechanisms of capitalism to work in the service of decarbonizing the economy, but I disagree with them ... Capitalism appropriates limits to capital by placing them in the service of capital; in the process, it obscures the inequities, socioeconomic distortions, and violence that these limits expose, thereby continuing the cycle of endless economic growth that is achieved at the expense of more vulnerable entities and groups ... Climate capitalism neutralizes the politics of climate and environmental change because it advances, reproduces, and reinforces the oppressive material economic conditions and structures endemic to commodity culture and the free-market economy – the selfsame system that produced climate warming". See Adrian Parr, *The Wrath of Capital: Neoliberalism and Climate Change Politics* (New York: Columbia University Press, 2013) 10, 21.

be engaged similarly or distinctly? If there should be a departure from the market-approach in respect of certain ESTs and/or for certain categories of people or States, what factors should be considered in making such distinctions? These are knotty sub-structural questions that must be dealt with to have an equitable and effective global EST development and transfer regime. But even if these questions are answered, there remains the question of what is the best platform through which they can be advanced. Should it be embedded in a treaty, a resolution or a non-binding instrument? Or, giving the central role played by companies in EST development and transfer, should it be engaged like the UN Guiding Principles on Business and Human Rights? An attempt is made here to engage some of these questions, although not comprehensively. A five-step research agenda is proposed below.

5.1 Reframing the Debate: Reconceiving the South – North Relationship

Developing States insist that developed states' obligations in the international climate regime arise from historical responsibility and not merely hinged on capacity.³ In contrast, developed States continue to engage the subject of financial and/or technological contributions outside the context of 'history'. They focus on capacity and future emissions.⁴ In fact, for the distinct provision on 'loss and damage' to make it into the Paris Agreement, a qualifying text on it, not amounting to acceptance of

³ See for example India's 2017 submission on further guidance for the NDC where it stated that "while the developed country Parties have to take the lead, arising out of historical responsibility, a differentiated guidance framework will ensure the developing country Parties retain the space necessary to pursue their sustainable development goals" See "India's Submission on Further Guidance for the Nationally Determined Contributions (NDCs) under the Paris Agreement" (2017) online: <http://www4.unfccc.int/Submissions/Lists/OSPSubmissionUpload/176_356_131503559958877314-India%20Submission%20APA%20Agenda%203%20NDC.pdf> See also G77 Statement to the Paris Climate Change Conference where it was noted that "...Annex I country Parties and other developed countries in Annex II have the principal responsibility in providing support". See "Statement on behalf of the Group of 77 and China by Ambassador Nozipho Mxakato-Diseko from South Africa, at the Opening Plenary of the 21st COP to the UNFCCC (Paris, France, 30 November 2015)" online: <<http://www.g77.org/statement/getstatement.php?id=151130b>>.

⁴ See for example the U.S. submission on the Paris Agreement, where they noted that "we would not support a bifurcated approach to the new agreement, particularly one based on groupings that may have made sense in 1992 but that are clearly not rational or workable in the post-2020 era. There have been, and will continue to be, dramatic and dynamic shifts in countries' emissions and economic profiles that make such an approach untenable, environmentally and otherwise". See "U.S. Submission on Elements of the 2015 Agreement" online: <https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/u.s._submission_on_elements_of_the_2105_agreement.pdf>. The descriptor 'developed States' employed in this chapter recognises that 'developed states', borrowing Obiora Okafor's phrasing, are not 'monolithic collegiums'. Within developed States are entities which bear the brunt of climate change and fossil economy. For instance, the source of livelihood and culture of indigenous people in Canada have been threatened by oil exploration for years. See Centre for Indigenous Environmental Resources, "How Climate Change Uniquely Impacts the Physical, Social and Cultural Aspects of First Nations" (2006) <https://www.afn.ca/uploads/files/env/report_2_cc_uniquely_impacts_physical_social_and_cultural_aspects_final_001.pdf>.

‘liability or compensation’ had to be inserted in the accompanying decision.⁵ It is argued here that the contentions of both developing and developed States need not be considered in isolation. While it is undeniable that the historical emission of developed States is responsible for the present global climatic conditions, it is also non-contestable that if not stopped, emissions from developing States, especially BRICS States, will make the global climatic condition grimmer.⁶ There is also a case to be made for ‘capacity’ both in determining the ability of a ‘developed’ state to contribute and which ‘developing’ state qualifies as a beneficiary. In other words, instead of construing the arguments as distinct matters of historical culpability, capacity and prospective liability, they can be put across as a single narrative, one that acknowledges the past, caters for the present and considers the future. A more holistic narrative, therefore, is that the present capacity of developed states is, in part, attributable to past climate damaging activities; therefore, they bear an obligation to deploy their capacities to make it unnecessary for developing States to develop unsustainably - unsustainable patterns of development which will make them also culpable in the future.

The validity and acceptability of the future responsibility argument rest on the recognition of historical responsibility.⁷ A refusal to accept and give effect to the historical responsibility of developed states, is a negative template for engaging emerging economies regarding the future. There is simply no justification for insisting that China and India should rein in emissions because of futuristic culpability if past emissions leading to the current climate condition is not redressed. The acceptance of historical responsibility has both precedential and deterrence values. It provides a justifiable ground to contest the claim of developing States to the ‘right to emit’ and makes clear the likely liability they will bear for current emissions.

As noted in chapter two, historical responsibility is not a stand-alone concept; it shares the same rationale with the *Polluter Pays principle*, a principle recognised and applied in most developed

⁵ See *Adoption of the Paris Agreement*, Dec. 1/CP. 21, UNFCCCOR, 2015, FCCC/CP/2015/L.9/Rev. 1, para 51. See also Linda Siegele, “Loss and Damage (Article 8)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 224 at 228.

⁶ Kennedy Liti Mbeva & Pieter Pauw, “Self-Differentiation of Countries’ Responsibilities: Addressing Climate Change through Intended Nationally Determined Contributions” (2016) 4 Discussion Paper, German Development Institute, 19 – 21.

⁷ As argued by Adrian Parr, “...it is inconsistent to argue in favour of erasing historical responsibility in order to achieve historical responsibility – the responsibility for future lives. This is like having your cake and eating it. *Supra* note 2 at 10.

States.⁸ Ingrained in the *Polluter Pays principle* (PPP) are ‘past unsustainable acts’, ‘present adverse repercussions’ and the ‘necessity of indemnity’.⁹ While the view advocated in this work draws on the PPP, it does so recognising the validity of the capacity and future responsibility claims. Few existing works have attempted a similar fused approach. Relevant to this work are Simon Caney’s hybrid approach,¹⁰ Carl Knight’s pluralistic approach,¹¹ and the beneficiary pays approach.¹² These views are considered and critiqued below. The review is followed by what is described as the *holistic narrative* which blends the views of both developing and developed states, and a ‘normative payment’ concept. As will be shown, this approach has the advantages of being more inclusive and politically acceptable than existing approaches.

Simon Caney derived his hybrid approach from the ability to pay principle (APP) which he suggested makes up for three inadequacies of the PPP: the inability of earlier generations who emitted to pay (since most are dead); excusably ignorant emitters who should not be expected to pay; and non-compliant emitters who will not pay.¹³ To Caney, APP obligates the “most advantaged” to either reduce their GHG emissions in proportion to the harm caused by previous generations, excusably ignorant emitters or non-compliant emitters, or “address the (resultant) ill-effects”.¹⁴ Worth noting is that the APP is deemed forward looking, and takes no cognizance of historical emissions. The problem with this approach is that it cannot be deemed ‘obligatory’ or construed as a justice claim. APP allocates liability through current affluence, regardless whether the wealth is gained via a ‘non-climatically wrong’ way. In attempting to justify APP, Caney argued:

It is true that they (advantaged) may not have caused the problem but this does not mean that they have no duty to help solve this problem. Peter Singer’s well-known example of a child drowning in a puddle brings this point out nicely. Suppose that one encounters a child face

⁸ See generally Eric Thomas Larson, “Why Environmental Liability Regimes in the United States, the European Community and Japan have grown Synonymously with the Polluter Pays Principle” (2005) 38 *Vanderbilt Journal of Transnational Law* 541 – 575.

⁹ As noted by Simon Caney, “the polluter pays principle is ... a backward looking or historical principle ... it follows that those who contribute to climate change ... should make amends for it...” See Simon Caney, “Climate Change and the Duties of the Advantaged” (2010) 13:1 *Critical Review of International Social and Political Philosophy* 203 at 205.

¹⁰ *Ibid.*

¹¹ Carl Knight, “Climate Change and the Duties of the Disadvantaged: Reply to Caney” (2011) 14:4 *Critical Review of International Social and Political Philosophy* 531 – 542.

¹² See Edward Page, “Give it up for Climate Change: A Defence of the Beneficiary Pays Principle” (2012) 4:2 *International Theory* 300 – 330; Daniel Butt, “‘A Doctrine Quite New and Altogether Untenable’: Defending the Beneficiary Pays Principle” (2014)

¹³ Simon Caney, “Cosmopolitan Justice, Responsibility, and Global Climate Change” (2005) 18 *Leiden Journal of International Law* 747 at 766 – 767.

¹⁴ *Ibid* at 769.

down in a puddle. The fact that one did not push the child in obviously does not mean that one does not have a duty to aid the child.¹⁵

Notably, Caney's reference to the 'advantaged' refers to 'affluent people' rather than 'affluent countries'.¹⁶ It is suggested that the focus on 'people' rather than 'States' is the core flaw of both Caney's criticism of PPP, and by extension, his conception of APP. To start with, in the global climate regime, the computation of historical emission is country-based. To make a case for 'individual' computation of emissions is simply unrealistic. If accepted that the computation of historical emissions is country based, then Caney's suggested limitation of PPP, i.e., that earlier generations are unable to pay because they are dead, is not tenable. This is because, except in extraordinary situations, States are continuous. Indeed, developed States which are beneficiaries of the industrial revolution and its resultant climate-decimating emissions are still in existence. Taking a cue from its State-focused analysis, Caney's second alleged limitation of the PPP is also questionable, because an absence of knowledge does not, in itself, suffice as justification for past climate-damaging emissions. This is more so as these States persisted in unsustainable practices even in the 20th century, when scientific findings had emerged regarding anthropogenic contributions to climate change.¹⁷ There is also the strict liability argument in response to this second criticism.¹⁸ Caney's third limitation on the inability of emitters to make good their liability due to lack of capacity is, however, a justifiable criticism of the PPP. The argument here is not that climate change liability is solely 'State-based', but that in the 'historical responsibility' context, the traditional 'State' is the most practical and useful focal point. But as has been (and will be) shown, the unpacked State is constituted by 'persons'

¹⁵ *Ibid* at 769 – 770.

¹⁶ *Ibid* at 770.

¹⁷ As noted elsewhere, "roughly half of all the CO₂ released into the atmosphere from human activity since 1750 (over 600 billion tonnes) was emitted between 1980 and 2008". See Page, *supra* note 12 at 320.

¹⁸ The Supreme Court of Louisiana, for example, applied the strict liability doctrine, in a case where a tree which looked healthy, although rotted out and hollow beneath, fell on a car. The court held that 'ignorance' of the unhealthy state of the tree did not absolve the defendant of liability. See *Loescher v. Parr* 324 So. 2d 441, 1975 La. LEXIS 4205. Although this position has been statutorily altered in Louisiana (See generally Louisiana Civil Code, art. 2317.1), it accords with the rule in *Rylands v. Fletcher* [1868] UKHL 1 which states that a person who puts a land into a non-natural use, is liable for the consequence of doing so, if "in the course of their doing it, the evil arose ... namely, the escape of the water..." The House of Lords in the later case of *Cambridge Water Co Ltd v. Eastern Counties Leather Plc* [1993] ABC LR 12/09, however, held that, "knowledge, or at least foreseeability of the risk, is a prerequisite of the recovery of damages under the principle; but that the principle is one of strict liability in the sense that the defendant may be liable notwithstanding that he has exercised all due care to prevent the escape from occurring". In the climate change context, it has been argued elsewhere that "Just reparation ... should also take into account the fact that people in developed countries were for a long time ignorant of the effects on the climate of emissions. Ignorance is no reason for refusing to make reparation, but it may be a reason for reducing demands". See Janna Thompson, "Historical Responsibility and Climate Change" in Lukas Meyer & Pranay Sanklecha, eds, *Climate Justice and Historical Emissions* (Cambridge: Cambridge University Press, 2017) 46 at 58 – 59. See also Daniel Butt, *Historical Emissions: Does Ignorance Matter?* *Ibid* at 61 – 79.

(humans and corporations). Hence, responsibilities or benefits appropriated to ‘States’ invariably pertains to the ‘persons’.¹⁹

In a more recent work, Caney finetuned his position on APP, by positing a hybrid approach comprising two principles:

Principle 1: Persons should bear the burden of climate change that they have caused so long as doing so does not push them beneath a decent standard of living (the *Poverty-Sensitive Polluter Pays Principle*).

Principle 2: The duties to bear the Remainder should be borne by the wealthy but we should distinguish between two groups – (i) those whose wealth came about in unjust ways, and (ii) those whose wealth did not come in unjust ways – and we should apportion greater responsibility to (i) than to (ii). (*the History-Sensitive Ability to Pay Principle*)²⁰

Caney’s hybrid approach is close to the position sought to be advanced in this work. It is, however, doubtful if in a real sense, Caney’s approach can be considered ‘hybrid’. This is because both principles apply disjunctively, not conjunctively. For example, the use of ‘unjust ways’ in principle 2 refers to non-climate related issues.²¹ The *holistic narrative* developed in this work, while recognising principle 1 of Caney’s proposition, does not embed principle 2. Reasons for excluding principle 2 include the non-definiteness of subjects which constitute ‘unjust acts’ and the less likely political acceptability of such principle. Again, ‘unjust acts’ are people centric and the redress for them is the responsibility of a defined group, unlike climate change which effect is borderless and, therefore, creates obligations for the ‘whole world’. The approach advanced here is also distinct from Caney’s approach in following ways: the bearers of duties under the *holistic narrative* concept are essentially

¹⁹ This is exemplified by the implementation of international agreements. For instance, States submitted NDCs under the PA, but at the implementational level, through different mechanisms, impose obligations on their ‘citizens’. An example is the Pan-Canadian Framework on Clean Growth and Climate Change, (online: <<https://www.canada.ca/content/dam/themes/environment/documents/weather1/20170125-en.pdf>>). But as queried by Sara Seck, “what should the role of business be where a state has chosen not to incorporate private financing or market-based approaches to climate change, or the approaches adopted are clearly inadequate?” See Sara Seck, “Business Responsibilities for Human Rights and Climate Change – A Contribution to the Work of the Study Group on Business and Human Rights of the International Law Association” (2017) online: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2974768>. An example of this is the United States’ decision to opt out of the Paris Agreement. In such a scenario where the ‘State’ has refused to taken responsibility, individuals and corporate entities should “take up the gauntlet”. But this does not necessarily mean that this is distinct and apart from the ‘State’s’ fulfilment of its obligation. For example, following the United States failure to meet its financial commitment, Michael Bloomberg offered to pay. In his words, “America made a commitment and, as an American, if the government’s not going to do it then we all have a responsibility”. See “Climate Change: Michael Bloomberg Pledges \$4.5m for Paris Deal”, BBC News (23 April 2018) online: <<https://www.bbc.com/news/world-us-canada-43860590>>. The argument here is that seeming gulf between ‘private entities’ and ‘the State’ is not unbridgeable.

²⁰ *Supra* note 9 at 219.

²¹ Caney referred to slave trade and appropriated lands from indigenous peoples as instances of unjust acts. *Ibid* at 216 – 217.

States (and by extension their people and companies),²² and unlike Caney's approach which supports the ecological space argument, the *holistic narrative* account considers the ecological space argument as antithetical to the sustainable development agenda of developing States and the EST transfer cause. We will come back to these points shortly.

Caney's *hybrid approach* has also been criticized elsewhere. In identifying three objections to it – the disadvantaged polluter, the disadvantaged saint, and the license to pollute - Carl Knight argued that:

Its (the hybrid approach) treatment of disadvantaged persons and their duties is especially problematic. The hybrid view's indifference to the circumstances polluters face and only partial reference to wider justice issues leaves some polluters unduly disadvantaged by harsh duties. Perhaps the biggest problem is that the very disadvantaged – the global poor – have very limited duties of climate justice or the hybrid view.²³

Further to this, Knight suggested a 'pluralistic account'.²⁴ This account advocates that the cost of climate change should be allocated in a way that "best promote(s) advantage levels", in a manner which benefits the worst-off which has made better choices more than the better-off which has made the worse choices.²⁵ Practically, the account argues for the recognition of polluters which were circumstantially forced to emit, the joint consideration of climate injustice and other kinds of injustice, and that although the poor should be given preference, they should not be given the license to pollute. As noted previously, the expansion of 'justice' in the climate regime to cover non-climate related justice issues is not endorsed in this work. While the point on 'survival emissions' of certain developed States is credible, it might be difficult to determine the quantum of such emissions from their 'luxurious emissions'. Again, the distinction between 'survival' and 'luxurious' emissions is not

²² Caney made non-state entities – individuals, firms, sub-state political entities and international financial institutions – has the primary duty bearers. See *Ibid* at 219. While the influence of these entities as players in the climate regime cannot be disputed, it seems inefficient to make them the core duty bearers. While there are now ground-breaking works on carbon majors tracing emissions to corporate entities (see Richard Heede, *Carbon Majors: Accounting for Carbon and Methane Emissions 1854 – 2010 Methods and Results Report* (Colorado: Climate Mitigation Services, 2014) and Paul Griffin, "The Carbon Major Database CDP Carbon Majors Report 2017" (2017) CDP Report), responsibilities have been historically attached to States in the climate regime. Even with this new research, it is difficult to divorce oil majors from their home States. As shown in chapter two, it is historically proven that in international negotiations, States represent the positions of their business entities. Another view is the remittances of these companies to their home States, which drive the States' development. Further, elsewhere the preference for a state-centric approach was justified because States are "the ontological units at the heart of existing domestic and international environmental law on climate change" and "given the intergenerational and international character of the climate problem ... States ... are currently the only entities operating internationally that possess sufficient longevity, financial resources, and physical capacity to bear the required burdens". See Page, *supra* note 12 at 302.

²³ *Supra* note 11 at 2.

²⁴ *Ibid*.

²⁵ *Ibid* at 14.

always clear, since what is ‘luxurious’ to some might be ‘survival’ to others.²⁶ The third point on the inappropriateness of the ‘license to pollute’ for developing States accords with the position earlier advanced here. In this regard, Knight advances Caney’s *hybrid approach*

While the *hybrid approach* emphasised the capacity of the duty bearer, and the *pluralistic account* took stock of an unduly broad historical responsibility concept, the *Beneficiary Pays Principle* (BPP) posits that “States should shoulder burdens associated with responding to climate change according to the extent that they have derived economic benefits from activities”.²⁷ Unlike the PPP which centers on cause, and APP which focuses on capacity, the BPP is cause-blind and capacity insensitive. As explained elsewhere, BPP’s argument to a state is “you should pay because you are much better off than others as a result of exploiting benefits linked to the creation of climate change”. The connection of liability and capacity to climate change is an advantage BPP has over APP, and by extension, Caney’s *hybrid approach*. Again, as noted by Page, unlike the APP and the *hybrid approach* which give reasons why States *could* pay, BPP justifies why States *should* pay.²⁸ In Page’s unjust enrichment strain of BPP, States which have obtained ‘unjust benefits’ are obligated to ‘give up’ rather than ‘pay back’ such benefits.²⁹ ‘Wrongdoing’ only arises when states “refuse to surrender the benefits necessary for the effective management of climate change”.³⁰

Again, the BPP, while qualifying as a ‘justice claim’, has questionable deterrence worth, and seems impracticable. While ‘climate wrongdoers’ often double as ‘beneficiaries’, not all ‘beneficiaries’ are wrongdoers and it is not unlikely that certain wrongdoers are not beneficiaries. A focus on ‘beneficiaries’ therefore makes the ‘wrong’ the benefit derived, rather than the harmful act. This is of limited deterrence value to the ‘harmful act’ itself. More importantly is the problem of tracing ‘benefits’ - to what extent should the ‘benefit’ be traced? An example would be coal mined in State

²⁶ For example, ‘luxurious fossil fuel intensive cars’ are often given as examples of ‘luxurious emissions’. While it might be luxurious to the user, it is not ‘luxurious’ to the manufacturing plant worker who relies on the continued production and sales of such cars for his survival.

²⁷ Page, *supra* note 12 at 306. BPP was described elsewhere thus: “Agents can come to possess obligations to lessen or rectify the effects of wrongdoing perpetrated by other agents through benefitting, involuntarily, from the wrongdoing in question”. See Butt, *supra* note 12 at 338. Page further identified two strains of the BPP, which emerge by reason of the normative concerns about the impracticality of asking that “all benefits implicated in some way to the creation of climate change be surrendered” and that “the mere receipt of a benefit” does not trigger “a duty of disgorgement designed to remedy the disadvantage created”. The two strains are the *wrongful enrichment BPP* and the *unjust enrichment BPP*. He stated that the latter is preferential to the former because it best responds to the normative concerns identified. See Page, *supra* note 12 at 307 – 308, 313.

²⁸ Page, *supra* note 12 at 311.

²⁹ *Ibid* at 314.

³⁰ *Ibid*.

A, exported to State B, used to power plants that produce machines exported to States C, D and E, which also produce materials for further export. Which of the States will be deemed the beneficiary or beneficiaries? Or, how far should the benefit derived from the coal mining be traced? Further, since the focus is on benefit, do profits made from loan or aids provided to other States, from States which unsustainably developed, qualify as ‘benefits’? Again, is there a quantum for measuring benefits derived and/or required to be given up? In what appears to be an attempt to respond to these objections, Page referred to BPP’s ‘net benefit’ and ‘no debilitating cost’ provisos.³¹ While the first suggests that benefits to be ‘given up’ are what remain after benefits obtained via positive industrial structures are deducted, the second states that “states can only be asked to surrender benefits that they actually possess and can be surrendered without significant harm to their citizens”.³² Neither of these provisos speaks to the objection of tracing raised above. But assuming they do, they raise further problems. One, the net benefit proviso presumes, wrongly, that there can, in all situations, be a distinction between ‘wrongly’ and ‘rightly’ derived benefits. Two, the phrase ‘without significant harm’ is bereft of precise meaning, as what constitutes ‘significant harm’ is relative.

Although the *holistic narrative* draws from the three approaches/principles considered above, it attempts to sidestep the objections levelled against them. Importantly, this narrative emphasises practicality and political acceptability. The narrative states that:

- i. States responsible for historical emissions are obligated to make available resources to States without capacity to mitigate or adapt to climate change, to the extent to which such responsible States are capable.
- ii. Emerging economies are liable for emissions made beyond their ‘survival emissions’ or resources for sustainable development, either possessed by them and/or made available to them by developed states.
- iii. States not responsible for historical emissions, are developing sustainably, and have capacity to assist less advantaged States, should endeavour to make available resources to less advantaged States.
- iv. Less advantaged States should be prioritised in the order in which they are prone to climate change implications (in respect of adaptation interventions) and/or they have sustainably developed (in respect of mitigation interventions).

The 4-layered narrative proposed here takes into account the positions of both developed and developing States, recognises the past and caters for the future, incentivizes sustainable practices in developing States, gives a role to every party in the climate regime although with differentiated

³¹ *Ibid* at 318.

³² *Ibid*.

obligation-levels, and generally centres the ‘environment’ as against the ‘economy’. It is believed that this narrative can be more easily operationalised than the BPP, as there are existing data on historical and current emissions. The most contentious of these propositions is likely (iv) as developing States might contend that being responsible for the current climate condition, developed States are in no position to impose terms. However, to develop unsustainably blunts the justification for any accusation levelled against developed states which have allegedly developed unsustainably. Proposition (iv) gives due recognition to States which, despite their economic conditions, have striven to sustainably develop. Simultaneously, it discourages other developing states from using their economic conditions as an excuse for unsustainable practices. It should be noted that all the above propositions take their cue from proposition (i). If proposition (i) is not operationalized, parties responsible for propositions (ii) – (iv) will lack the impetus to act.

However, an objection by Caney to the Polluter Pays Principle is that to apply the PPP, “we need to be able to specify the harm done and trace it back to the causal factors and where either the nature of the harm is uncertain or unpredictable ... or the link between the climate change and the harm is uncertain then this cannot be done”.³³ Proposition (i) which ascribes duties on the basis of harm caused is also affected by this objection. It is, however, contestable that for a duty to be ascribed, specific harm needs to be attached to a specific wrongdoer. Indeed, this is impossible in respect of climate change. As there is only one global climate and, in the atmosphere, the source of emission becomes irrelevant. A more valid concern emanating from this objection seems to be whether there is an endpoint to the ‘reparation’ to be done by historical emitters. At what point can they be said to have settled their climate ‘debt’? While there is no easy answer to this question, it is suggested that underpinning the question is the presumption that payback can only be done through ‘tangible reparation’, whether in terms of ‘money’ or ‘technology’ (which can also be measured in money). Hence, the focus of developing States has been financial contributions by developed states by reason of their historical responsibility. It is, however, proposed that one way historical emitters can ‘close’ their liability account is by making what is described here as ‘normative payment’.

Normative payment requires that the cost to be paid for past emissions should be behaviour based and norm related. While it is farfetched (although desirable) to expect the North to jettison neoliberalism, normative payment demands that as far as ESTs go, the market should play a very minimal role, and

³³ Caney, *supra* note 9 at 206 – 207.

profit-making should not be the dominant objective. The currency of the normative payment in the climate change context is a normative shift from neoliberalism to humanism. India, in its NDC to the UNFCCC, highlighted this kind of shift, contending that:

There is a need to evolve a set of precepts, a kind of commandments, especially for the youth of the world, that help in developing a unified global perspective to economic growth so that the disparity in the thinking of the 'developed' and 'developing' countries could be bridged. The removal of such barriers of thought and the creation of a regime where facilitative technology transfer replaces an exploitative market driven mechanism could pave the way for a common understanding of universal progress. If climate change is a calamity that mankind must adapt to while taking mitigation action withal, it should not be used as a commercial opportunity. It is time that a mechanism is set up which will turn technology and innovation into an effective instrument for global public good, not just private returns.³⁴

Indeed, the operation of neoliberalism and its trappings of private ownership and commercialism are by no means unqualified, even in developed States. For example, issues pertaining to health care and national security are not simply left to the vagaries of the market.³⁵ A nexus has been drawn elsewhere on the link between climate change and national *qua* transnational security.³⁶ The relationship between climate change and health has also been established.³⁷ These connections, in part, provide justifications for a normative payment *viz* a shift from a market-centric approach to ESTs, to a more open and humanized framework. One way this can be operationalized is to incentivize norm shifts by EST developing and producing companies. Home countries can award credits or give tax reliefs to companies with initiatives to facilitate EST development and transfer in less advantaged States. Such

³⁴ See India's Intended Nationally Determined Contribution: Working Towards Climate Justice" online: < <http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>> at 2

³⁵ For example, further to the s. 2(2)(A) of the United States Foreign Investment and National Security Act, 2007, the Committee on Foreign Investment in the United States (CFIUS) is empowered to "conduct an investigation of a covered transaction on the national security of the United States, and take any necessary actions in connection with the transaction to protect the national security of the United States".

³⁶ The CAN Corporation, a US Navy funded think tank reported in 2007 that "climate change can act as a threat multiplier for instability in some of the most volatile regions of the world, and it presents significant national security challenges for the United States". See Kurt M. Campbell et al, "The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change", (2007) online: < https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/csis/pubs/071105_ageofconsequences.pdf>. See also Joshua Busby, "Climate Change and National Security: An Agenda for Action" (2007) online: < https://cfrd8-files.cfr.org/sites/default/files/report_pdf/ClimateChange_CSR32%20%281%29.pdf>.

³⁷ See World Health Organization, "Protecting Health from Climate Change: Vulnerability and Adaptation Assessment" (2013) online: < http://apps.who.int/iris/bitstream/handle/10665/104200/9789241564687_eng.pdf?sequence=1&isAllowed=y>.

initiative must, however, entail wholesome transfer of hardware, software and orgware, and not just barebone.

In a way, the normative payment concept bears semblance to the CDM. However, what will be rewarded here is norm-shift: a shift from a market centric approach to a human centred approach. Indices through which this can be appraised include: disclosures and release of previously protected know-how and rights at concessional and affordable costs; the establishment and/or support for research institutions in less advantaged States; joint RD&D with research institutions in less advantaged States; and in-country manufacturing of ESTs in host States. While the norm shift must necessarily start from ‘industrialized States’, it is expected to trickle to emerging and developing economies. Ultimately, this ‘human-centric’ approach can (and should) become the template for EST development and transfer both internationally and domestically. This way, the underprivileged in both developing and developed States, stand a better chance to access ESTs. A justification for normative payment is that at the root of climate change is a ‘wrong norm’; that of prioritising profit making over sustenance of the environment.³⁸ Therefore, a corresponding ‘payment’ should be a reversal of the same norm which created the problem. Further, ‘normative payment’, while it does not completely rule out financial aid or transfer of specific technologies, deemphasises them. Instead, it focuses on ‘enabling’ less advantaged States to conduct their own research and develop their own technologies. Again, the criticism against the PPP that the full impact of climate change is unknown, hence, ‘cost’ is uncertain is circumvented by the normative payment concept. While further work will subsequently be done on the ‘normative payment’ concept, views expressed below on a human right approach to EST transfer, consideration of ESTs as public goods and the development of an international/national systems of innovation, further consolidate the idea of ‘normative payment’ suggested here.

5.2 Humanizing the Global EST Development and Transfer Regime

Distillable from Karl Marx’s commodity fetishism theory is the idea of the objectivation of commodity and the subjectivation of humanity.³⁹ To bestow value on a commodity outside its response and usefulness to a human need is another expression of this fetishism. This is what the

³⁸ As noted elsewhere, “...technology transfer is needed because the ordinary functioning of the international trade regime will not be adequate to the technological needs of the climate change regime”. See International Council on Human Rights Policy (ICHRP), *Beyond Technology Transfer: Protecting Human Rights in a Climate-Constrained World* (Geneva: ICHR, 2011) 15.

³⁹ See generally Karl Marx, “The Fetishism of Commodities and the Secret Thereof” published online: <<https://web.stanford.edu/~davies/Symbsys100-Spring0708/Marx-Commodity-Fetishism.pdf>>.

global EST ‘market’ has done. The value of ESTs is detached from its human impact. It is one thing to see solar technology and improvements thereon as prospects for making trillions of dollars. It is another thing to construe it in the light of the life, health and subsistence needs of disadvantaged States.⁴⁰ For example, the World Health Organization notes 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”.⁴¹ The World Food Programme also notes that “the number of people at risk of hunger will increase by 10 – 20% due to climate change, with 65% of this population in Sub-Saharan Africa. The number of malnourished children could increase up to 21% ... with the majority being in Africa”.⁴² In Nigeria, thousands have died in 2018 alone from conflict between herdsmen and farmers in what the government has attributed in part to the “drying up of the Chad Basin” which has forced herdsmen to move further in-country.⁴³ These are examples of the ‘human’ context of climate change.

It has been argued elsewhere that rather than the oppositional stances between developing and developed States on the transfer of ESTs, human rights provide “a language on which broad agreement already exists over minimal standards for action” on transfer of technologies.⁴⁴ This argument is premised on the assertion that:

...climate change is already undermining the realisation of a broad range of internationally protected human rights: rights to health and even life; rights to food, water, shelter and property; rights associated with livelihood and culture; with migration and resettlement; and with personal security in the event of conflict.⁴⁵

⁴⁰ Caney highlighted the rights to life, health and subsistence as fundamental to climate change. See, Simon Caney, “Climate Change, Human Rights and Moral Thresholds” in Stephen Humphreys ed., *Human Rights and Climate Change* (Cambridge: Cambridge University Press, 2010) 74.

⁴¹ WHO, “Climate Change and Health” (2018) online: <<http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>>.

⁴² Met Office Hadley Centre and WFP, “Climate Impacts on Food Security and Nutrition: A Review of Existing Knowledge” (2012) online: <https://documents.wfp.org/stellent/groups/public/documents/communications/wfp258981.pdf?_ga=2.211052693.1804529180.1531217454-1159540535.1531217454>

⁴³ Samuel Ogundipe, “Nigeria: Herdsmen Crisis – Presidency Blames Climate Change, Politicians – Explores Solution”, *Premium Times*, (8 July 2018) online: <<https://allafrica.com/stories/201807090020.html>>.

⁴⁴ *Supra* note 38 at 3 – 4. See also Oche Onazi, “Access to Essential Environmental Technologies and Poor Communities: Why Human Rights should be Prioritized” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 191 – 194 and Baskut Tuncak, “The ‘new normal’: food, climate change and intellectual property” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 223 - 241.

⁴⁵ *Supra* note 38 at 19.

Focusing on the rights to life, health and basic means of subsistence, Simon Caney made a case for a ‘right to technology transfer’, anchoring it on what he described as the adaptation-based, mitigation-based and restitution-based arguments.⁴⁶ While the restitution-based argument borders on the polluter pays principle already discussed above, he framed the adaptation-based argument as the necessity for the transfer of adaptation ESTs “to allow individuals to enjoy their human rights despite experiencing climate harms”; and he premised the mitigation-based argument on the need to “allow people to continue to enjoy their human rights without thereby contributing to climate change”.⁴⁷

The human rights approach to EST transfer further rests on the fact that there are international instruments already agreed to by countries on the rights threatened by climate change. The *International Covenant on Economic, Social and Cultural Rights*⁴⁸ is particularly worth noting. The ICESCR, *inter alia*, provides that States parties must recognize the right of everyone to “an adequate standard of living ... adequate food, clothing and housing, and the continuous improvement of living conditions” and “the highest attainable standard of physical and mental health”.⁴⁹ Perhaps, the most relevant provision in the ICESCR on EST transfer is Article 15(1)(b) which provides for “the right of everyone ... to enjoy the benefits of scientific progress and its applications”. The Covenant further points out that “steps to be taken ... to achieve the full realization of this right shall include those necessary for the conservation, the development and the diffusion of science”.⁵⁰ Arguably, the rights contained in the ICESCR are binding on States not only internally, but transnationally.⁵¹ It is, therefore, contestable that market barriers to ESTs are in breach of the ICESCR, particularly Article 15(1)(b), (2), (3) and (4). This, however, leaves the issue of Article 15(1)(c) which recognises the right of an innovator (author) to “the protection of the moral and material interests resulting from any scientific, literary or artistic production”.

One of the novel inclusions in the Paris Agreement is the admonition that “Parties should, when taking action to address climate change, respect, promote and consider their respective obligations to human

⁴⁶ *Ibid* at 19 – 32.

⁴⁷ *Ibid* at 21 - 22.

⁴⁸ International Covenant on Economic, Social and Cultural Rights (16 December 1966) 993 UNTS 14531 (Entered into force 3 January 1976) (ICESCR).

⁴⁹ ICESCR, arts. 11 & 12.

⁵⁰ ICESCR, art. 15(2).

⁵¹ See ICESCR, art. 2(1) providing that “each State Party to the present Covenant undertakes to take steps, individually and through international assistance and cooperation, especially economic and technical, to the maximum of its available resources, with a view to achieving progressively the full realization of the rights recognised in the present Covenant by all appropriate means”.

rights...”⁵² This recognition was made only in the preamble of the Agreement which does not constitute a substantive binding provision. However, in international law, treaties contain what Liav Orgad describes as interpretive preambles.⁵³ The interpretive role of preambles is recognised by the Law of Treaties which provides that in interpreting a treaty in their context, such context shall comprise of, *inter alia*, its preamble.⁵⁴ Arguably, therefore, provisions of the Paris Agreement, including Article 10, must be interpreted in accordance with the preamble. Hence, the reference to ‘respective obligations to human rights’ in the preamble easily admits of international human right obligations like those earlier considered under the ICESCR.

The above is, however, less than half of the story. Importantly, the implications of the climate change – human rights linkage on private corporations, given their central role in the global EST matrix, must be considered. Rendered differently, do corporate entities have a duty to consider human rights in their development, management and distribution of ESTs? More contextually, do EST developing and manufacturing companies have the ‘right’ to set market terms which make ESTs vital to the life, health and subsistence of the disadvantaged inaccessible? The subject of corporations’ human rights obligations, particularly, in the environmental context, has received some attention.⁵⁵ This should, however, be distinguished from the question raised here. While the environmentally degrading actions of multinational companies in developing States can more directly be linked to the breach of the rights of people living in those countries, it is more difficult to draw such a connection in respect to the unwillingness or unreadiness of corporations to transfer ESTs or hoarding of know-how.

One way to approach this issue is to argue that although international obligations cannot be directly and ‘internationally’ imposed on private entities, States which have ratified agreements are duty bound to ensure compliance by their corporations. In a way, this argument aligns with the second guiding principle contained in the ‘Guiding Principles on Business and Human Rights’⁵⁶ which recognises

⁵² Paris Agreement, preamble.

⁵³ Liav Orgad, “The Preamble in Constitutional Interpretation” (2010) 8 Intl J of Const L 714 at 723 – 726.

⁵⁴ See Vienna Convention on the Law of Treaties, 1969, art. 31(2).

⁵⁵ See for examples, Peter Newell, “Climate Change, Human Rights and Corporate Accountability”, *supra* note 35 at 126 – 158 and Sara Seck, “Business, Human Rights, and Canadian Mining Lawyers” (2015) 56 Canadian Business Law Journal 208 – 237.

⁵⁶ United Nations Human Rights Office of the High Commissioner, “Guiding Principles on Business and Human Rights: Implementing the United Nations ‘Protect, Respect and Remedy’ Framework”, 2011, HR/PUB/11/04, online: < https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf>

“the role of business enterprises ... to comply with all applicable laws and to respect human rights”.⁵⁷ The Guiding Principles further provide that businesses have the responsibility to “avoid causing or contributing to adverse human rights impacts...; seek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services...”⁵⁸ The human rights obligation of private businesses is made even more forceful in the ‘Norms on the Responsibilities of Transnational Corporations’. It is recognized here that:

...Within their respective spheres of activity and influence, transnational corporations and other business enterprises have the obligation to promote, secure the fulfilment of, respect, ensure respect of and promote human rights recognized in international as well as national law, including the rights and interests of indigenous people and vulnerable groups.⁵⁹

Except for the opposition of businesses to the norms on corporate responsibilities and subsequent tacit jettisoning,⁶⁰ the above provision could have been stretched to suggest that companies involved in EST development and production have the obligation to secure the fulfilment of, and to promote human rights in the way they manage technologies. It is, indeed, doubtful if companies will be positively disposed to a reading and/or interpretation of the Guiding Principles which encroaches on or limits their proprietary control or management of their products (technologies).

The ‘Human Rights Guidelines for Pharmaceutical Companies in relation to Access to Medicines’⁶¹ (the Hunt Guidelines) is instructive as to how the human rights obligations of EST companies in respect of access to ESTs can be developed and operationalized. The international EST and pharmaceutical regimes share diverse commonalities. One is their connection to health and life. Again, both regimes face similar access challenges. As noted by Paul Hunt, the Guidelines was published further to the complaint of developing States about “the policies and practices of some pharmaceutical companies ... for example, excessively high prices, inadequate attention to research and development

⁵⁷ *Ibid* at 2. Principles 2 and 3 are particularly worthy of note in this regard. While principle 2 directs States to “set out clearly the expectation that all business enterprises domiciled in their territory ... respect human rights throughout their operations”, principle 3, in part, requires States to enforce laws mandating States to respect human rights, ensure that laws in respect of the creation and operation of business enterprises “do not constrain but enable business respect for human rights” and “provide effective guidance to business enterprises on how to respect human rights throughout their operations”.

⁵⁸ Guiding Principles, para. 13(a)(b).

⁵⁹ *Norms on the Responsibilities of Transnational Corporations and other Business Enterprises with regard to Human Rights*, UNESCOR, 2003, UN Doc E/CN.4/Sub.2/2003/12/Rev.2, para. 1

⁶⁰ Newell, *supra* note 55 at 134.

⁶¹ Paul Hunt, “Report of the Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health: Human Rights Guidelines for Pharmaceutical Companies in relation to Access to Medicines”, 2008, UNGA, 63rd sess, A/63/263 online: <http://www.who.int/medicines/areas/human_rights/A63_263.pdf>

concerning diseases that disproportionately impact people in developing countries ... and problematic clinic trials”.⁶² As noted in previous chapters, these also constitutes the core challenges of the EST regime. The Hunt Guidelines can, therefore, be conveniently adopted, as much as practicable, in respect of access to ESTs.

In its preamble, the Hunt Guidelines endorses clearly that “pharmaceutical companies ... have human rights responsibilities in relation to access to medicines”.⁶³ However, it balanced this with a recognition of the companies’ “responsibility to enhance shareholder value”.⁶⁴ Substantively, the Guidelines admonish companies to “adopt a human rights policy statement which expressly recognises the importance of human rights”, and that the companies should “integrate human rights ... into (their) strategies, policies, programmes, projects and activities”.⁶⁵ Worth highlighting are the Guidelines’ provisions on disadvantaged populations,⁶⁶ disclosure of accessibility initiatives,⁶⁷ publicly available policy on access,⁶⁸ “public commitment to contribute to research and development for neglected diseases”,⁶⁹ allowing developing states to fully employ flexibility provisions under TRIPS and “not to lobby for more demanding protection of intellectual property interests...”,⁷⁰ issuance of non-exclusive voluntary licences,⁷¹ not patenting “trivial modifications on existing medicines”,⁷² and differential pricing between and within countries and simplicity of discount schemes.⁷³

The above highlighted provisions, if adopted into the EST regime, will go a long way to improve access for developing States to ESTs. However, given the hostile reception of the Hunt Guidelines by pharmaceutical companies,⁷⁴ despite the deliberate effort to be non-peremptory and the attempt to

⁶² *Ibid* at 7.

⁶³ *Ibid*, para i of the preamble.

⁶⁴ *Ibid*, para j of the preamble.

⁶⁵ *Ibid*, paras 1 and 2.

⁶⁶ *Ibid*, para 5.

⁶⁷ *Ibid*, para 7.

⁶⁸ *Ibid*, para 10.

⁶⁹ *Ibid*, paras 23 - 25.

⁷⁰ *Ibid*, para 26.

⁷¹ *Ibid*, para 30.

⁷² *Ibid*, para 32.

⁷³ *Ibid*, paras 33 – 38.

⁷⁴ See Suerie Moon, “Respecting the Right to Access to Medicines: Implications of the UN Guiding Principles on Business and Human Rights for the Pharmaceutical Industry” (2013) 15:1 Health and Human Rights 32 at 36.

consult widely with companies in the preparation of the Hunt Guidelines,⁷⁵ it is unlikely that multinational EST companies will positively receive a Human Rights Guidelines for Access to ESTs. Yet, this is important, and, again, the normative payment concept might be helpful in this regard. The presumption is that companies, in the end, are concerned about their bottom line. So, the question is how to ‘guarantee’ this bottom line while holding the companies to a responsibility to mainstream human rights in their management of EST innovations and products? Alongside the normative payment suggestions, the concept of differential pricing contained in the Hunt Guidelines are ways to strike this balance. The cooperation of developed States (and emerging economies) will be crucial for a differential pricing scheme to succeed. Further research is, however, needed on this subject.

5.3 Reconceiving ESTs as Global Public Goods

ESTs as technologies essential to life, health and subsistence, raise the question of how they should be treated – as purely private commodities or global public goods (GPGs)? It is proposed here that ESTs are best engaged and dealt with as GPGs. Maskus and Reichman define GPGs as “goods (including policies and infrastructure) that are systematically underprovided by private market forces and for which such under-provision has important international externality effects”.⁷⁶ They construe ‘externality effect’ to arise when “a failure to provide the public good imposes costs on third parties”.⁷⁷ GPGs are described elsewhere as “resources, services and systems of rules or policy regimes that generate non-excludable benefits and that are non-rival in use”.⁷⁸ Given the inability of the market to provide GPGs, their provision becomes the responsibility of the collective.⁷⁹ According to Adam Smith, “goods of general benefit to a society would have to be funded by means of a general contribution”.⁸⁰ As noted by Maskus and Reichman, environmental protection provides a classic

⁷⁵ *Supra* note 61 at 11.

⁷⁶ See Keith Maskus & Jerome Reichman, “The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods” (2004) 7:2 J Intl Economic L 279 at 284. They further identified ‘non-excludability’ and ‘non-rivalry’ as the components of GPGs. While the former refers to goods that “unauthorized parties (“free riders”) cannot be prevented from using”; the latter refers to one which use does not “restrict the ability of another actor to benefit from it...”

⁷⁷ *Ibid.*

⁷⁸ PBL Netherlands Environmental Assessment Agency (NEA), *A Global Public Goods Perspective on Environment and Poverty Reduction: Implications for Dutch Foreign Policy* (The Hague: NEA, 2011) 10.

⁷⁹ *Ibid* at 11.

⁸⁰ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Book IV, R.H. Campbell & A.S. Skinner, eds (Oxford: Clarendon Press, 1976) ix. 52 cited in Peter Drahos, “The Regulation of Public Goods” (2004) 7:2 J Intl Economic L 321.

example of a situation giving rise to GPGs.⁸¹ Essentially, the GPG concept negates the idea of private proprietary rights in ESTs, and the exclusivity they enjoy in law. Rather, the sheer demand for ESTs and the fact that the benefits of their deployment (especially mitigation ESTs) are global, demands a public approach to their development, funding and overall management.⁸² The phrase ‘public approach’ is used in both the national and international contexts.

As noted in previous chapters, in recent times there has been a drop in public R&D funding, resulting in private entities taking the lead in such investments.⁸³ The increasing dominance of corporate organisations in R&D portends greater protectionism and private proprietary rights claims on ESTs. Beyond this is the influence corporate organisations have over their home States and the ripple effect this has in framing global technology transfer policies. This situation was described by Maskus and Reichman as “private capture”, a situation where “knowledge cartel(s)” which “control the distribution of a disproportionately large share of existing technologies ... push their governments to regulate the global market in ways that lock in temporary competitive advantages without necessarily advancing global public interest”.⁸⁴ Private ownership notwithstanding, developed States have the capacity, whether through incentives or regulatory tools to influence corporate entities to make their innovations accessible. Paragraph 34.18(e) of Agenda 21 provides options for doing this, including purchasing “patents on commercial terms for their transfer to developing countries on non-commercial terms”. This, in part, attends to the demand of Article 15(1)(c) of the ICESCR to ensure that innovators derive material benefits from their innovation.

Again, the GPG concept is diametrically opposite to the central contention of developed States that market tools, like the protection of IPRs and patents, must foster innovation and transfer of ESTs. Recent studies have made this conclusion questionable.⁸⁵ In a historical study of patent’s impact on

⁸¹ *Supra* note 76 at 284. See also S. Niggol Seo, “A Theory of Global Public Goods and their Provisions” (2016) 16:4 *Journal of Public Affairs* 394 at 395.

⁸² Scott Barrett classifies “climate change protection” as *aggregate efforts GPGs*. See Scott Barrett, *Why Cooperate: The Incentive to Supply Global Public Goods* (New York: Oxford University Press, 2007) 5 – 8.

⁸³ See “Lower Public R&D Spending and Protectionist Risks may pose a Threat to Innovation”, OECD (2016) online: <<http://www.oecd.org/innovation/lower-public-r-d-spending-and-protectionist-risks-may-pose-a-threat-to-innovation.htm>>.

⁸⁴ *Supra* note 76 at 19.

⁸⁵ See generally Michele Boldrin & David Levine, *Against Intellectual Monopoly* (Cambridge: Cambridge University Press, 2008); Andrew Torrance, “Patent Expertise and the Regress of Useful Arts” (2009) 33 *Southern Illinois University Law Journal* 239 - 277; and Petra Moser, “Patents and Innovation in Economic History” (2016) 8 *Annual Review of Economics* 241 – 258. Earlier studies however posited that patent facilitated innovation. A review of these literature are provided by David Kline. See David Kline, “Do Patents Truly Promote Innovation”, *IPWatchdog* (2014) online: <<http://www.ipwatchdog.com/2014/04/15/do-patents-truly-promote-innovation/id=48768/>>.

innovation, Petra Moser found that a “large majority of historical innovations occurred outside of the patent system” and that “countries without patent laws ... were at least as innovative as countries with patent laws”.⁸⁶ It was also found that where applied, IPRs were more beneficial when “narrow and short-lived”, and IPRs that circumvent options like “compulsory licencing” encouraged innovation.⁸⁷ Using what he described as a patent game which simulated patent and non-patent systems, Andrew Torrance also found that “there is no statistically significant difference in rates of innovation among a pure patent system, a patent/open source system and a commons system”. He noted, however, that:

There are statistically significant differences in rates of productivity and social utility among all three systems, with both productivity and social utility lowest in a pure patent system, higher in a patent/open source system, and highest in a pure commons system.⁸⁸

The point here is that neither the private ownership nor patent arguments are valid enough to prevent the engagement of ESTs as GPGs. But there are other concerns. A major one is the ‘free-rider’ problem. As pointed out elsewhere, “as no-one can be excluded from their use once public goods are provided, there is no incentive to pay for them”.⁸⁹ How can free-riding be guarded against in a GPG – EST international regime (a regime where EST innovations are disclosed, knowledge is freely shared, and adaptation of technologies is not restricted)? Further, since global collectivity is central to such GPG regime, how can it be ensured that every country contributes to such a regime? One way around the first question is the establishment of an international registry for EST innovations, which can also serve as a common pool for such innovations. To correct the mistakes of the eco-patent commons initiative, this international registry should involve all technologies or essential technologies held by an entity. This point is made without disregard for the observation in chapter three that a commons registry, as proposed here, in itself does not guarantee the availability of ESTs in developing States. Regardless, it is an important piece of the puzzle. The subject of collective contribution is considered under the next recommendation.

5.4 Transnational System(s) of Innovation

One of the findings highlighted in the preceding chapters is the lack of market stimulus for EST companies to specifically research into climate change challenges specific to African States.

⁸⁶ Moser, *Ibid* at 257 – 258.

⁸⁷ *Ibid*.

⁸⁸ Torrance, *supra* note 85 at 277.

⁸⁹ Clara Brandi et al, “Intellectual Property Rights as a Challenge to Providing Global Public Goods: The Cases of Public Health, Food Security and Climate Stability” (2010) 17 Discussion Paper, German Development Institute 7. See also Barrett, *supra* note 77 at 6.

Consequently, existing technologies are often ill-suited to the peculiar needs or conditions of these States. This, among other reasons, make an integrated global system of innovation critical. Transnational system(s) of innovation (TSI) can be construed as an expression of the ‘collective contribution’ imperative of the GPG concept. TSI was described elsewhere as “the result of an integration process between two or more adjacent regional innovation systems across national borders of two or more neighboring systems of innovation”.⁹⁰ In other words, TSI is an aggregate of systems of innovation. A system of innovation (SI), construed broadly, entails “parts and aspects of the economic structure and the institutional set-up affecting learning as well as searching and exploring”.⁹¹ TSI presents a different model to the extant donor – recipient approach to EST transfer. It allows for the involvement of developing states in R & D and fosters the development of their innovative capacities. But a challenge here is that for TSI to be optimal, constituting national SIs must possess mutually beneficial and complementary capacities. Chaminade & Nielson refer to this as cognitive proximity; that is, “the differences or similarities between individuals and organizations in their level of competences and knowledge”.⁹² While they note that there should not be too much proximity, they emphasise that when there is too much distance, “the absorption capacity and the benefits of such interaction are ... low”.⁹³ This same point was highlighted in a 2010 study of the SBSTA on collaborative EST R&D thus:

...entities with similarities in size, financial resources and technical endowments are more likely to pursue collaborative R&D than when the balance of expertise in a collaboration is more one-sided. Brokering developed – developing country partnerships clearly needs to overcome this bias...⁹⁴

For the cognitive distance between African States and developed States to be reduced, African States’ SIs, particularly their universities and other research organs, must be focused on. While the CTCN would have been in an ideal position to do this, the point was made in chapter four, that it has not, and neither does its design seem to support such an initiative. Making a similar point, Ockwell and Bryne note that “CTCN’s activities do not explicitly recognize the need to nurture NSIs as part of the technology transfer, development, and diffusion process, although elements of innovation system

⁹⁰ Christina Chaminade & Hjalti Nielsen, *Transnational Innovation Systems*, (Mexico City: ECLAC-GIZ, 2011) 13.

⁹¹ B.A. Lundvall ed., *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning* (London: Pinter, 1992) 12 cited in *Ibid* at 10.

⁹² *Supra* note 90 at 17.

⁹³ *Ibid*.

⁹⁴ *Report on Options to Facilitate Collaborative Technology Research and Development: Note by the Chair of the Expert Group on Technology Transfer*, SBSTA, 33rd Sess., FCCC/SBSTA/2010/INF.11 (2010), para 64.

building are implicit within two of the CTCN's core services".⁹⁵ It is, therefore, not surprising that none of CTCN's initiatives so far entails any R&D capacity development project with universities in African States. This must change. Taking a cue from the university-R&D reliant EST industries in developed States and China, African States must turn their searchlight inwards and invest considerably in their research institutions. Rather than focusing on financial or hardware handouts from developed States, African States must begin to insist on collaborative programmes that will improve the capacity of their research institutions. It is only with such improved capacity that they can capably engage in TSIs. Again, the development of SIs by African States is important as "it will assist and accelerate the uptake of technologies ... and help ensure that these technologies become more central to the underpinning development processes".⁹⁶ While research institutions have been emphasised, they do not constitute an SI in themselves. Other actors, including firms, financial and investment institutions and public agencies must also be integrated to ensure funding, uptake and diffusion of innovations.

Still on the subject of the contributory capacity of African States in a TSI, without prejudice to the earlier point on the necessity of African States to focus on their SIs, it is argued that African States' rich repository of traditional knowledge, particularly in respect of climate change adaptation, constitutes tangible contribution to an EST TSI. As noted by the IPCC, "indigenous and traditional knowledge may prove useful for understanding the potential for certain adaptation strategies that are cost-effective, participatory and sustainable".⁹⁷ A recent publication on indigenous knowledge systems in Africa refers to traditional knowledge on seasonal climate prediction and weather forecast, underutilised crops and animal species, and adaptive farming systems like Lesotho's Machobane farming system.⁹⁸ The need for co-production of knowledge between "community based knowledge holders and natural and social scientists" has therefore been advocated.⁹⁹ It is, however, necessary that western researchers are open-minded, and recognise and respect this traditional knowledge as not less than 'orthodox science'. In formally recognising traditional knowledge and integrating it into

⁹⁵ David Ockwell & Rob Byrne, "Improving Technology Transfer through National Systems of Innovation: Climate Relevant Innovation-System Builders (CRIBS)" (2016) 16:7 *Climate Policy* 836 at 847.

⁹⁶ *Supra* note 94 at para 40.

⁹⁷ IPCC, *Review of the IPCC Processes and Procedures: Report by the InterAcademy Council*, 32nd Sess, IPCC-XXXII/Doc. 7 (2010) online: < http://www.ipcc.ch/meetings/session32/doc07_p32_report_IAC.pdf> 19.

⁹⁸ See generally P.L. Mafongoya & O.C. Ajayi eds, *Indigenous Knowledge Systems and Climate Change Management in Africa* (Wageningen: CTA, 2017)

⁹⁹ *Ibid* at 309.

mainstream R&D, the tendency of multinational companies to patent such will be reduced.¹⁰⁰ When duly recognised, the contributory potential of African States in a TSI set-up becomes more apparent. An EST-TSI arrangement should entail both international and continental/sub-continental components.¹⁰¹ At the international level, institutions like the CTCN and the International Renewable Energy Agency (IRENA), should serve as a ‘melting pot’ of EST innovators from around the world. Such an arrangement provides an environment of peer interaction, which is said to facilitate innovation.¹⁰² Referencing the U.S. led Manhattan project through which nuclear technology was developed, it was stated elsewhere that a collaborative approach to EST development will engender “accumulation of international resources (to) target issues that are beyond the innovative capacity of the individual nation-states”.¹⁰³ The Consultative Group on International Agricultural Research (CGIAR) is an example of such an R&D collaborative effort. The designated international institution should prioritise the most difficult and/or essential climate change problems for research. While it can be centralised like the European Council for Nuclear Research (CERN), it is preferable that the designated institution has regional research centers following the CGIAR model.¹⁰⁴

In Africa, it is proposed that EST R&D centres should be established in each of the five sub-regions of the continent. Each center should involve research institutions from sub-regional States and relevant developed countries. Aside the research institutions, collaboration should extend to partnership among manufacturing firms, financial institutions and markets for an effective uptake of developed technologies. Sub-regional R&D centres should focus on the most pressing needs of the countries

¹⁰⁰ The example of the University of Toledo application for patent for the use of Endod to control Zebra mussels, whereas Endod had been cultivated and used by the Ethiopian people was made elsewhere. See Njabulo Khumalo & Charity Baloyi, “African Indigenous Knowledge: An Underutilised and Neglected Resource for Development” (2017) *Library Philosophy and Practice* (e-journal) online: <<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=4727&context=libphilprac>> 1663 at 1670.

¹⁰¹ Brian Israel has proposed a Climate Technology Pool (CTP) which is guided by the ideals of full participation, deep cooperation, availability, and affordability. The CTP would “house a number of technology-specific consortia called projects. Each project would have defined technical objectives, membership, and allocated funds for grants and prizes ... The activities of the pool would span the technology cycle, from basic research through commercialization of ‘project technologies’ developed by the consortium. The pool would license project technologies worldwide, but would not displace participants’ to separately commercialize their patents”. See Brian Israel, “International Cooperation, Intellectual Property & Climate Essential Innovation” in Neil Craik, et al, *Global Environmental Change and Innovation in International Law* (Cambridge: Cambridge University Press, 2018) 223 at 234 – 235.

¹⁰² Chiminade & Nielson, *supra* note 90 at 9.

¹⁰³ Ivan Morales, “Balancing Intellectual Property Rights and Clean Technology Development: Encouraging Cooperation” (2017) 17 *Houston Journal of Health Law and Policy* 405 at 422 – 425.

¹⁰⁴ The CGIAR has fifteen “independent, not-for-profit” research centers hosting more than 8000 researchers and staff. See <<https://www.cgiar.org/research/research-centers/>>.

within the sub-region. This arrangement will not only ensure the integration of SIs at the sub-continental level. It will also help States to pull resources together efficiently to foster the development of relevant and necessary technologies. Research centres based at the sub-continental level could also complement conventional scientific knowledge with indigenous know-how.

The question of how both the international and sub-continental TSIs will be funded remains. While their funding should be prioritised by both the GCF and GEF, more innovative funding mechanisms should be evolved. One way is to levy multinational fossil fuel (oil, gas and coal) companies. Particularly, the companies operating in Africa can be required to pay a specific percentage into an innovation fund for the sub-continental research centers. France is also said to have proposed a “solidarity contribution levied on plane tickets ... to ... finance global sustainable development”.¹⁰⁵ This contribution can be extended to international shipping lines. Other MNCs can also be encouraged and incentivized to set-up green funds for African States.¹⁰⁶

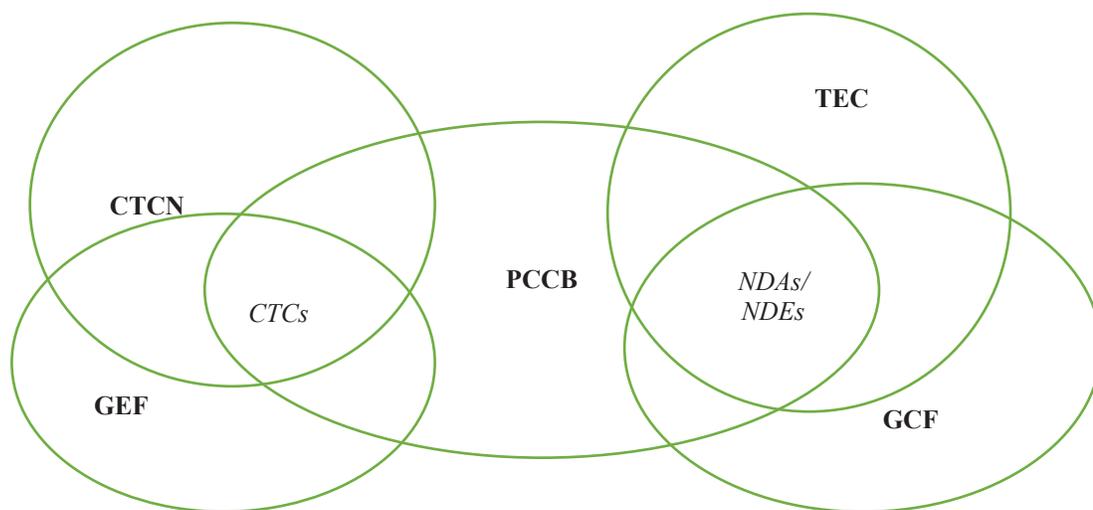
5.5 Breaking Silos: Integrating Institutions

The operationalization of the preceding normative recommendations mandates a rethinking and rearrangement of the international institutional structure on climate change, their EST development and transfer objectives, and the focus of party states. Importantly, the diverse international institutions involved in EST transfer should be integrated. There are three aspects to the issue of institutional integration. The first is intra-UNFCCC; the second is between UNFCCC and EST transfer related institutions; while the third involves the UNFCCC and other international institutions. The point was made in chapter four as to the existence of different institutional arrangements pertaining to EST transfer within the UNFCCC (the TM, FM and the PCCB). While it is unlikely that there will be a merger of these bodies, they can share ‘common sub-bodies’. For example, instead of the existence of a distinct CTCN under the TM, and separate Climate Technology Centres (CTC) under the GEF *qua* Poznan, a common CTCN can operate under both the TM and the FM. The same applies to the

¹⁰⁵ Barrett, *supra* note 82 at 104.

¹⁰⁶ See for example Apple’s recent launch of a \$300 million green energy fund in China. The fund involves Apple and ten of its suppliers and spans over a four-year period. Outside the UNFCCC FM, African States should push for similar funding initiatives like Apples’. See “Apple Launches \$300 Million Green Energy Fund in China”, Reuters, (12 July 2018) online: <https://www.reuters.com/article/us-apple-china/apple-launches-300-million-green-energy-fund-in-china-idUSKBN1K303D>. See other innovative funding proposals in Dennis Tirpak & Jo-Ellen Parry, “Financing Mitigation and Adaptation in Developing Countries: New Options and Mechanisms”, (2009) Background Paper, online: < https://www.iisd.org/pdf/2009/financing_mitigation_new_options.pdf>; UNFCCC, “Innovative Options for Financing the Development and Transfer of Technologies”, (2007) online: < https://unfccc.int/resource/docs/publications/innovation_eng.pdf>

existence of Nationally Designated Entities (NDEs) under the TEC and Nationally Designated Authorities (NDAs) under the GCF. Both should be integrated and controlled by the TEC and the GCF. Such integration will, to an extent, help resolve the financial challenge(s) of the TEC and the CTCN, and also spur the efficiency of these institutions. Without prejudice to the argument in chapter four on the non-necessity of the PCCB, if it must exist, then it should operate through the integrated sub-institutions under the TM and FM. The diagram below helps explain this sub-level integration concept.



Another level of integration is among international institutions and the UNFCCC. The operations of different institutions, while not directly related to climate change or ESTs, impact indirectly on EST development and transfer. Two such institutions are the World Trade Organization (WTO) and the World Bank. As noted in chapter two, the question of the most appropriate place to deal with the intellectual property concern remains one divisive issue between developing and developed States. While developing States argue that this subject should be dealt with under the UNFCCC, developed States have insisted it is an issue suited for the WTO. In aligning with the position of developing States, the ICHRP has advocated the making of an International Declaration on Climate Change and Intellectual Property Rights (DCCIPR) under the umbrella of the UNFCCC.¹⁰⁷ According to the organization:

As a matter of strategy, discussion of any proposed declaration need not, and probably should not, take place in the forum of the WTO. It may be more appropriate to seek such a declaration in the context of the broader mandate of the UNFCCC rather than the relatively narrow focus of the WTO TRIPS Agreement.¹⁰⁸

¹⁰⁷ ICHRP, *supra* note 38 at 77.

¹⁰⁸ *Ibid.*

While the ICHRP proposal is desirable, it seems impractical, considering the current entrenched positions of parties. A sub-institutional integration model, as earlier proposed, although of a less formal and intensive scope, is one way to approach this subject. The TEC, the WTO Committee on Trade and Environment (CTE), and other relevant international agencies like the World Intellectual Property Organization (WIPO), can establish a joint working and facilitation group to develop a declaration similar to what has been proposed by the ICHRP.¹⁰⁹ A similar pattern of sub-level integration can also be explored with the World Bank Group's climate finance initiatives, particularly the Climate Investment Funds (CIF).

The actual level of integration is the creation of a platform, coordinated by the TEC, involving the diverse organizations directly involved in EST development and transfer. These organizations, as indicated in chapter three, include social entrepreneurs, NGOs, regional organizations, international financial and corporate institutions and (national) public agencies. In a report by the UNFCCC Secretariat, although the growth in international transfer platforms were indicated, the non-existence of a comprehensive data on actors in the EST transfer sphere and the non-availability of "information on collaborative R&D activities and initiatives" were identified as challenges.¹¹⁰ The creation of an inter-institutional platform will help build a comprehensive database on transfer initiatives, map the location and distribution of projects and correct the existing lopsidedness in the siting of EST projects. Such a platform will also facilitate partnerships, assist the coordination of EST transfer initiatives and inform an efficient deployment of scarce resources. If the TEC must exist apart from the CTCN, then the coordination of this inter-institutional platform should be one of its key responsibilities.

The undergirding supposition of the above proposal on integration is that a global challenge like climate change is best approached in an integrated manner. Such integration, however, differs in scope. It entails 'hard integration' like what is proposed for the UNFCCC institutional mechanisms,

¹⁰⁹ The UNFCCC presently participates in the meetings of the CTE and serves as an ad hoc observer to the "committee overseeing specific trade and environment negotiations (CTESS)". The WTO also participates in the UNFCCC COP meetings. See WTO, "Activities of the WTO and the Challenge of Climate Change" online: <https://www.wto.org/English/tratop_e/envir_e/climate_challenge_e.htm> This, however, falls short of what is being proposed here. The ICHRP suggests that the proposed Declaration would "provide interpretive force if adopted through a COP decision, particularly if this was done in coordination with the Human Rights Council, the WIPO General Assembly and the WTO General Council (other relevant international organs are the UN Commission on International Trade Law and the International Centre for Settlement of Investment Disputes Rule-Making Bodies). See *supra* note 38 at 78.

¹¹⁰ *Mapping Climate Technology Development and Transfer Activities and Initiatives under and outside the Convention relevant to the Implementation of the Paris Agreement*, SBSTA, 45th Sess., FCCC/SBSTA/2016/INF.9 (2016), paras 17 – 22.

‘quasi integration’ like in the case of UNFCCC institutions and international State-based institutions, and ‘loose integration’ like between the UNFCCC and other technology transfer platforms. In a real sense, just as there is one global climate affected by one climate change challenge, there is no such thing as financial, technological, human rights or proprietary rights components of climate change; they are all pieces of the same complex whole. It is, therefore, critical that the international institutional arrangement reflects this reality. Again, more will need to be done on this subject of ‘integration’ in subsequent research.

5.6 Conclusion

The central objective of this thesis is to attempt a normative rethink of the global EST regime, taking its starting point from the UNFCCC. For this exercise, this work adopted a TWAIL approach to analysing the global *qua* UNFCCC EST structure. Rather than an overly antagonistic genre of TWAIL, TWAIL has been engaged here as a counter-hegemonic narrative tool which provides another viewpoint to the present market-dominant approach to EST development and management. In other words, the focus of this work is not to perpetuate the hitherto divisive brand of the South – North dichotomy. Rather, it is to represent such dichotomy as an opportunity to reconsider how the present EST construct is structured. This more conciliatory approach, while not jettisoning historical reality, allows for an open-mindedness to other realities and shows that these realities are not necessarily contradictory, and that they can be fused into one *holistic narrative*. However, to properly articulate this counter-hegemonic agenda, elements of which have been advanced in this chapter, it was necessary to look closely at both the historical and present structure and operations of the global and UNFCCC EST regime. The socio-political history of the regime over five distinct eras (pre-1992 era to the current technology mechanism era) was considered closely in chapter two. Chapter three reviewed specific programmes of the EST regime, particularly in select African States, and chapter four focused on the design and operation of the technology mechanism as recognised under the 2015 Paris Agreement. Some of the key findings from these chapters are:

- i. There is no major difference in the negotiating positions of parties. Issues relating to intellectual property rights, public – private institution dichotomy, peremptoriness or voluntariness of commitments, commitments as issues of responsibility or ability, the separation of allied institutions, have characterized the various phases of the international EST transfer regime.
- ii. Over its various phases, EST transfer has largely been negotiated by parties on sub-structural subjects of either actual transfer of technology/know-how or financial support. There has been no concerted and comprehensive consideration of the core normative issues which underpin and define the EST transfer sphere.

- iii. While there have been different initiatives over the years, transfer programmes are mostly dogged by the same challenges, chief among which are lack of funds, dominance of one-off projects, and the absence of composite enabling technology transfer schemes. While parties do not mind coming to the ‘table’ and documenting agreements, there has been no commensurate proof of willingness to give full effect to agreements reached. This has been described in this work as the ‘gap of will’.
- iv. Added to the absence of a comprehensive account of global transfer initiatives or a coordinating platform, there is a lopsided distribution of transfer projects among the regions of the world, with Africa being one of the least of the beneficiaries.
- v. The global EST industry is mostly dominated by private firms, resulting in a heavy commercialization of the market to the detriment of African States. African States represent unattractive markets either to incentivize purpose-made ESTs, or even to attract the transfer of existing products.
- vi. The ecological space argument, hitherto emphasised by the global South, is both antithetical to its developmental agenda and to EST transfer.
- vii. Given its immense human rights implications and the historical causation element of climate change, a market approach to climate change is both inappropriate and unjust. Such an approach also perpetuates the undeveloped state of developing States and fosters the hegemony of the global north.

The normative agenda sketched out in this chapter attempts to address some of the findings summarised above. But as noted earlier, a comprehensive discussion of each of the proposals cannot be accommodated here. They serve as ‘fodders’ for future research. Particularly, a question yet to be answered is whether ESTs should be generally considered as public goods, or whether specific ESTs qualify as such. Further, if all ESTs do not qualify as public goods, what are the modalities for distinguishing between the ‘eligible’ and ‘ineligible’ ones. Importantly, the ‘normative payment’ concept suggested here as a more availing alternative to ‘hard payment’ (finance and technology) needs to be further articulated and its potentials for operationalization considered.

While not a complete analysis of the EST regime, what is clear from this thesis is that a market dominant approach to ESTs will leave poor countries holding the shorter end of the climate change ‘stick’. The conversation must change at its very normative core. ESTs must be ‘humanized’ to be relevant to the persons most affected by climate change. Until a consensus is reached at this normative level, agreements will continually be reached at the international level and initiatives will be churned out, but there will be no actual impact where it really matters!

BIBLIOGRAPHY

International Documents

Treaties

Agenda 21: Programme of Action for Sustainable Development; The Final Text of Agreements Negotiated by Governments at the United Nations Conference on Environment and Development (UNCED), 3-14 June 1992, Rio De Janeiro, Brazil. (New York, NY: United Nations Dept. of Public Information, 1993)

Agreement on an International Energy Program, (As amended 30 November 2007)

International Covenant on Economic, Social and Cultural Rights (16 December 1966) 993 UNTS 14531 (Entered into force 3 January 1976)

Kyoto Protocol, UN Doc FCCC/CP/1997/7/Add.1, Dec. 10, 1997; 37 ILM 22 (1998)

Montreal Protocol on Substances that Deplete the Ozone Layer, 16 November 1987, 1522 UNTS 26369 (Entered into force 1 January 1989)

Paris Agreement, 12 December 2015, UNTS 54113

The Declaration of the United Nations Conference on the Human Environment, U.N. Doc. A/Conf.48/14/Rev. 1(1973); 11 ILM 1416 (1972)

United Nations Framework Convention on Climate Change, 9 May 1992, 1771 UNTS 30822

Vienna Convention on the Law of Treaties, 23 May 1969, 1155 UNTS 331 (Entered into force 27 January 1980)

Other International Documents

“Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4, Paragraph 5, of the Convention”, Annex to Decision 4/CP.7, FCCC/CP/2001/13/Add.1

“Terms of Reference to Expert Group on Technology Transfer”, Appendix to Decision 4/CP.7, FCCC/CP/2001/13/Add.1

“U.S. Submission on Elements of the 2015 Agreement” online:
<https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/u.s._submission_on_elements_of_the_2105_agreement.pdf>

Adoption of the Paris Agreement, Dec. 1/CP. 21, UNFCCCOR, 2015, FCCC/CP/2015/L.9/Rev. 1

Agreed Outcome Pursuant to the Bali Action Plan, Dec 1/CP. 18, FCCC/CP/2012/8/Add.1

Annual Technical Progress Report of the Paris Committee on Capacity-Building, SBI, 47th sess, FCCC/SBI/2017/11 (2017)

Contribution of Intellectual Property to Facilitating the Transfer of Environmentally Rational Technology – Communication from Ecuador’, (2013) WTO IP/C/W/585

Copenhagen Accord, Dec 2/CP. 15, UNFCCCOR, 2009, FCCC/CP/2009/11/Add. 1

Deepa Pullanikkatil, *Swaziland Technology Needs Assessment Report I – Climate Change Adaptation* (CANGO, 2016)

Development and Transfer of Technologies under the Subsidiary Body for Scientific and Technological Advice, Decision 3/CP.13, UNFCCCOR, 2007, FCCC/CP/2007/6/Add.1

Development and Transfer of Technologies Under the Subsidiary Body for Implementation, Decision 4/CP.13, UNFCCCOR, 2007, FCCC/CP/2007/6/Add.1

Development and Transfer of Technologies, Decision 2/CP.14, UNFCCCOR, FCCC/CP/2008/7/Add.1

Elaboration of a Strategic Program to Scale up The Level of Investment in the Transfer of Environmentally Sound Technologies, GEF, GEF/C.34/5.Rev.1 (2008)

Evaluation of the Poznan Strategic Programme on Technology Transfer: Final Report by the Technology Executive Committee, 43rd sess., FCCC/SBI/2015, Annex III

Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4, paragraph 5, of the Convention, Dec. 4/CP. 7, UNFCCCOR, 2001, FCCC/CP/2001/13/Add. 1 (Annex)

GEF, “Elaboration of a Strategic Program to Scale Up the Level of Investment in the Transfer of Environmentally Sound Technologies”, (2008) GEF/C.34/5.Rev.1

India, *Views from the Government of India on SBSTA Agenda Item No 4: Technology Framework under 10(4) of the Paris Agreement*, SBSTA, 45th Sess., FCCC/SBSTA/2016.MISC.4 (2016),

Initial Draft of the Technology Framework, SBSTA, 48th Sess., SBSTA48.Informal 1 (2018).

IPCC, *Review of the IPCC Processes and Procedures: Report by the InterAcademy Council*, 32nd Sess, IPCC-XXXII/Doc. 7 (2010) online: < http://www.ipcc.ch/meetings/session32/doc07_p32_report_IAC.pdf>

Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2013, SBSTA & SBI, 39th Sess, FCCC/SB/2013/1, para. 9

Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2016, SBSTA & SBI, 45th sess, FCCC/SB/2016/1 (2016)

Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2017, SBSTA & SBI, 47th sess, FCCC/SB/2017/3 (2017)

Joint Annual Report of the Technology Executive Committee and the Climate Technology Centre and Network for 2015, SBSTA & SBI, 43rd sess, FCCC/SB/2015/1 (2015)

Kenya’s Climate Change Technology Needs and Needs Assessment Report Under the United Nations Framework Convention on Climate Change (National Environment Management Authority, 2005)

Linkages between the Technology Mechanism and the Financial Mechanism of the Convention: Recommendations of the Technology Executive Committee, COP, 20th Sess, FCCC/CP/2014/6

Linkages between the Technology Mechanism and the Financial Mechanism of the Convention, COP, 21st Sess, Dec 13/CP.21, FCCC/CP/2015/10/Add.2

Linkages between the Technology Mechanism and the Financial Mechanism of the Convention, COP, 22nd Sess, Dec 14/CP.22, FCCC/CP/2016/10/Add.2

Mapping Climate Technology Development and Transfer Activities and Initiatives under and outside the Convention relevant to the Implementation of the Paris Agreement, SBSTA, 45th Sess., FCCC/SBSTA/2016/INF.9 (2016)

Modalities and Procedures for a Clean Development Mechanism as defined in Article 12 of the Kyoto Protocol, Decision 17/CP.7, UNFCCCOR, FCCC/CP/2001/13/Add.2

Nairobi Outcome Document of the High Level United Nations Conference on South – South Cooperation” (Annex) 64th sess., 44/222 A/RES/64/222 (2009)

Norms on the Responsibilities of Transnational Corporations and other Business Enterprises with regard to Human Rights, UNESCOR, 2003, UN Doc E/CN.4/Sub.2/2003/12/Rev.2

Outcome of the Work of the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention: Draft Conclusions Proposed by the Chair, Draft Decision -/CP.15, UNFCCCOR, 2009, FCCC/AWGLCA/2009/L.7/Add.3

Paul Hunt, “Report of the Special Rapporteur on the Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health: Human Rights Guidelines for Pharmaceutical Companies in relation to Access to Medicines”, 2008, UNGA, 63rd sess, A/63/263 online: <http://www.who.int/medicines/areas/human_rights/A63_263.pdf>

Proposal by the G77 & China for A Technology Mechanism under the UNFCCC, online: <http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/technology_proposal_g77_8.pdf>

Proposals by India for Inclusion of Additional Agenda Items in the Provisional Agenda of the 17th Session of the Conference of Parties, 21 September 2011, FCCC/CP/2011.INF.2

Report of the GEF on the Elaboration of a Strategic Programme to Scale up the Level of Investment in the Transfer of Environmentally Sound Technologies, SBI, 29th Sess., (2008), FCCC/SBI/2008/16e9f7.pdf>

Report of the Subsidiary Body for Scientific and Technological Advice on its forty-sixth session, held in Bonn from 8 to 18 May 2017, SBSTA, 46th sess, FCCC/SBSTA/2017/4

Report of the Subsidiary Body for Scientific and Technological Advice on its forty-fifth session, held in Marrakech from 7 to 15 November 2016, SBSTA, 45th sess, FCCC/SBSTA/2016/4

Report on Options to Facilitate Collaborative Technology Research and Development: Note by the Chair of the Expert Group on Technology Transfer, SBSTA, 33rd Sess., FCCC/SBSTA/2010/INF.11 (2010)

Report on the Independent Review of the Effective Implementation of the Climate Technology Centre and Network”, FCCC/CP/2017/3

Report on the Linkage Modalities and the Rolling Workplan of the Technology Executive Committee for 2013 – 2013 – Note by the Chair of the Technology Executive Committee, SBSTA & SBI, 36th Sess, FCCC/SB/2012/1 (2012)

Report on the UNCED, (3 -4 June 1992) A/CONF.151/26 (VOL. IV)

Reports of the Conference of the Parties on its Sixteenth Session, held in Cancun from 29 November to 10 December 2010, Decision 1/CP.16, UNFCCCOR, 2010, FCCC/CP/2010/7/Add.1

Resolution 3202 (S-VI), Programme of Action on the Establishment of a New International Economic Order, 6th Special Session, A/RES/S-6-3202, 1 May 1974

Review of the Implementation of Commitments and of other Provisions of the Convention: UNFCCC Guidelines on Reporting and Review, UNFCCCOR, 5th Sess, FCCC/CP/1999/7 (2000)

SBSTA, 10th Sess., (1999) Development and Transfer of Technologies – Submissions from Parties: Part One, FCCC/SBSTA/1999/MS.5

SBSTA, 13th Sess., (2000) Development and Transfer of Technologies – Status of the Consultative Process (Submission of Parties) online: <<https://unfccc.int/resource/docs/2000/sbsta/misc04.htm>>

SBSTA, 8th Sess., 1998, *Development and Transfer of Technologies – Technology and Technology Information Needs Arising from the Survey of Developing Country Parties*, FCCC/SBSTA/1998/INF.5

Second Synthesis Report on Technology Needs Identified by Parties not Included in Annex I to the Convention, SBSTA, 30th Sess, FCCC/SBSTA/2009/INF.1 (2009)

South African Department of Science and Technology, “South Africa’s Climate Change Technology Needs Assessment: Synthesis Report” (2007) online: <http://unfccc.int/ttclear/misc/_StaticFiles/gnwoerk_static/TNR_CRE/e9067c6e3b97459989b2196f12155ad5/9ecba2a40fe04948859b9930a40b>

Statement of H.E. Mr. Ali Hassan Mwinyi, President of the United Republic of Tanzania, Report of the United Nations Conference on Environment and Development, *Statements Made by Heads of State or Government at the Summit Segment of the Conference*, A/CONF.151/26/Rec.1 (Vol. III)

Statement of Maurice F. Strong, *Report of the United Nations Conference on Environment and Development*, A/CONF.151/26 (vol. IV).

Strategy Paper for the Long-term Perspective Beyond 2012, including Sectoral Approaches, to Facilitate the Development, Deployment, Diffusion and Transfer of Technologies under the Convention – Report by the Chair of the Expert Group on Technology Transfer, SBI & SBSTA, 30th Sess., FCCC/SB/2009/3 (2009)

Submission by the Group of G77 and China on the Paris Committee on Capacity-Building (PCCB)” online: < http://www4.unfccc.int/Submissions/Lists/OSPSubmissionUpload/653_259_131179168610475088-SUBMISSION%20BY%20GROUP%20OF%2077%20AND%20CHINA%20ON%20THE%20PCCB_FINAL.pdf >

Synthesis Report on Technology Needs Identified by Parties not Included in Annex 1 to the Convention, SBSTA, 24th Sess, FCCC/SBSTA/2006/INF.1 (2006)

The Cancun Agreements: Outcome of the Work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Dec. 1/CP.16, UNFCCCOR, 2010, FCCC/CP/2010/7/Add.1

The Republic of Korea Submission on the Technology Framework under Article 10, Paragraph 4 of the Paris Agreement, Paper no. 8: Republic of Korea in *Elaboration of the Technology Framework*, SBSTA, 45th Sess., FCCC/SBSTA/2016.MISC.4 (2016)

Third Synthesis Report on Technology Needs Identified by Parties not Included in Annex 1 to the Convention, SBSTA, 39th Sess, FCCC/SBSTA/2013/INF.7 (2013)

United Nations Declaration on the Permanent Sovereignty over Natural Resource, Resolution 1803 (XVIII), 1962

United Nations Human Rights Office of the High Commissioner, “Guiding Principles on Business and Human Rights: Implementing the United Nations ‘Protect, Respect and Remedy’ Framework”, 2011, HR/PUB/11/04, online: < https://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf >

United States Submission, *Report of the United Nations Conference on Environment and Development*, A/CONF.151/26 (vol. IV)

Jurisprudence

Cambridge Water Co Ltd v. Eastern Counties Leather Plc [1993] ABC LR 12/09

Case Concerning the Right of Passage over Indian Territory (Preliminary Objections) (Portugal v. India) ICJ Reports 1957, 142

Loescher v. Parr 324 So. 2d 441, 1975 La. LEXIS 4205

Rylands v. Fletcher [1868] UKHL 1

The Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 ICJ Rep 226

Trail smelter case (United States, Canada) (1905 – 1982) VOL. III Reports of International Arbitral Awards

Monographs

Anghie, Antony. *Imperialism, Sovereignty and the Making of International Law* (Cambridge: Cambridge University Press, 2005)

Barrett, Mark et al. *Assured Access to the Global Commons* (Virginia; NATO, 2011).

Barrett, Scott. *Why Cooperate: The Incentive to Supply Global Public Goods* (New York: Oxford University Press, 2007).

Blobel, Daniel & Nils Meyer-Ohlendorf, eds. *United Nations Framework Convention on Climate Change Handbook*, (Bonn: Climate Change Secretariat, 2006).

Boldrin, Michele & David Levine. *Against Intellectual Monopoly* (Cambridge: Cambridge University Press, 2008).

- Bravo, Elizabeth & Ivonne Yanez eds, *No More Looting and Destruction: We the Peoples of the South are the Ecological Creditors* (Quinto: SPEDCA, 2003).
- Chaminade, Christina & Hjalti Nielsen. *Transnational Innovation Systems*, (Mexico City: ECLAC-GIZ, 2011).
- Chowdhury, Sarwat, et al. *Handbook for Conducting Technology Needs Assessment for Climate Change* (New York: UNDP, 2010).
- Cryer, Robert. et al, *Research Methodologies in EU and International Law* (Oxford: HART Publishing, 2011).
- Cullet, Philippe. *Differential Treatment in International Environmental Law* (Milton Park, Abingdon, Oxon: Routledge, 2016).
- Gross, R. et al. *Conducting Technology Needs Assessments for Climate Change* (New York: UNDP, 2004).
- Haghighi, S.S. *Energy Security – The External Legal Relations of the European Union with Major Oil and Gas Supplying Countries* (Portland: HART Publishing, 2007).
- International Council on Human Rights Policy (ICHRP). *Beyond Technology Transfer: Protecting Human Rights in a Climate-Constrained World* (Geneva: ICHRP, 2011).
- Kothari, C.R. *Research Methodology: Methods and Techniques, 2nd edn* (New Delhi: New Age, 2004).
- Kreft, Sonke, et al. *Global Climate Risk Index 2017: Who Suffers Most From Extreme Weather Events? Weather-related Loss Events in 2015 and 1996 to 2015* (Bonn: Germanwatch e.V., 2017).
- Mafongoya, P.L. & O.C. Ajayi eds. *Indigenous Knowledge Systems and Climate Change Management in Africa* (Wageningen: CTA, 2017).
- Mauil, H. “Oil and Influence: The Oil Weapon Examined” in G. Treverton, ed, *Energy and Security* (Gower Publishing, 1980).
- Morris, Craig & Martin Pehnt, *The German Energiewende Book*, (Berlin: Heinrich Boll Stiftung, 2017).
- Nygaard, Ivan & Ulrich Elmer Hansen, *Overcoming Barriers to the Transfer and Diffusion of Climate Technologies, 2nd edn* (Copenhagen: UNEP DTU Partnership, 2015).
- Parr, Adrian. *The Wrath of Capital: Neoliberalism and Climate Change Politics* (New York: Columbia University Press, 2013).
- PBL Netherlands Environmental Assessment Agency (NEA), *A Global Public Goods Perspective on Environment and Poverty Reduction: Implications for Dutch Foreign Policy* (The Hague: NEA, 2011).
- Rajamani, Lavanya. *Differential Treatment in International Environmental Law* (Oxford: Oxford University Press, 2006).
- Rifkin, Jeremy. *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World* (New York: Palgrave Macmillan, 2011).
- Rogers, Everet. *Diffusion of Innovations, 5th edn* (New York; Free Press, 2003).
- Scott, Richard. *The History of the International Energy Agency 1974 – 1994: Origins and Structure*, Vol. 1 (Paris: OECD Publications, 1994).
- Stern, Nicholas. *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007).
- Yergin, Daniel. *The Prize: The Epic Quest for Oil, Money and Power* (New York: Simon and Schuster, 1999).

Collection of Essays

- Agarwal, Anil & Sunita Narain. *Global Warming in an Unequal World: A Case of Environmental Colonialism*, loose- leaf (New Delhi: Centre for Science and Environment, 1991).
- Bulmer, Jane; Meinhard Doelle & Daniel Klein. “Negotiating History of the Paris Agreement” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 50.

- Correa, Carlos. “Intellectual Property Rights under the UNFCCC: Without Response to Developing Countries’ Concerns” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016).
- Davies, Anna. “Partnership and Sharing: Beyond Mainstream Mechanisms” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 108.
- Ferreira, Patricia. “Differentiation in International Environmental Law: Has Pragmatism Displaced Considerations of Justice?” in Neil Craik, et al, *Global Environmental Change and Innovation in International Law* (Cambridge: Cambridge University Press, 2018).
- Gastelumendi, Jorge & Inka Gnittke. “Climate Finance (Article 9)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017).
- Heleen de Coninck and Ambuj Sagar, “Technology Development and Transfer (Article 10)” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 258.
- Islam, M. Rafiqul. “History of the North – South Divide in International Law: Colonial Discourses, Sovereignty, and Self-Determination” in Shawkat Alam, et al., eds, *International Environmental Law and the Global South* (Cambridge: Cambridge University Press, 2015).
- Israel, Brian. “International Cooperation, Intellectual Property & Climate Essential Innovation” in Neil Craik, et al, *Global Environmental Change and Innovation in International Law* (Cambridge: Cambridge University Press, 2018) 223.
- Kravchenko, Svitlana *et al.* “Principles of International Environmental Law” in Shawkat Alam *et al*, *Routledge Handbook of International Environmental Law* (2012) online: < <https://www.routledgehandbooks.com/doi/10.4324/9780203093474.ch3>>.
- Niang, Isabelle et al. “Africa” in Christopher Field et al, eds, *Impacts, Adaptation, and Vulnerability Part A: Global and Sectoral Aspects*, (New York: Cambridge University Press, 2014).
- Onazi, Oche. “Access to Essential Environmental Technologies and Poor Communities: Why Human Rights should be Prioritized” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 191.
- Patel, Surendra, et al, eds. *International Technology Transfer: The Origins and Aftermaths of the United Nations Negotiations on a Draft Code of Conduct* (The Hague: Kluwer Law International, 2001).
- Rajamani, Lavanya & Emmanuel Guerin. “Central Concepts in the Paris Agreement and How they Evolved” in Daniel Klein et al, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 74.
- Shabalala, Dalindyabo. “Technology Transfer for Climate Change and Developing Country Viewpoints on Historical Responsibility but Common but Differentiated Responsibilities” in Joshua D. Sarnoff, ed., *Research Handbook on Intellectual Property and Climate Change* (Cheltenham: Edward Elgar Publishing, 2016).
- Siegele, Linda. “Loss and Damage (Article 8)” in Daniel Klein et al eds, *The Paris Agreement on Climate Change: Analysis and Commentary* (Oxford: Oxford University Press, 2017) 225.
- Srinivas, Krishna Ravi. “Climate Change, Technology Transfer and Intellectual Property Rights: A Modest Exercise in Thinking Outside the Box” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 167.
- Thompson, Janna. “Historical Responsibility and Climate Change” in Lukas Meyer & Pranay Sanklecha, eds (Cambridge: Cambridge University Press, 2017) 46.
- Tuncak, Baskut. “The ‘new normal’: food, climate change and intellectual property” in Abbe E.L. Brown, ed, *Environmental Technologies, Intellectual Property and Climate Change: Accessing, Obtaining and Protecting* (Cheltenham: Edward Elgar, 2013) 223.

Articles

- Anghie, Antony & B.S. Chimni. "Third World Approaches to International Law and Individual Responsibility in Internal Conflicts" (2003) *Chinese Journal of International Law* 77.
- Banner, Stuart. "Legal History and Legal Scholarship" (1998) 76:1 *Washington University Law Review* 37.
- Bell, Derrick. "Brown v. Board of Education and the Interest – Convergence Dilemma" (1980) 93 *Harv L Rev* 518.
- Brown, R. Blake. "A Taxonomy of Methodological Approaches in Recent Canadian History", (2004) 34:1 *Acadiensis* 145.
- Caney, Simon. "Climate Change and the Duties of the Advantaged" (2010) 13:1 *Critical Review of International Social and Political Philosophy* 203.
- Caney, Simon. "Cosmopolitan Justice, Responsibility, and Global Climate Change" (2005) 18 *Leiden Journal of International Law* 747 at 766.
- Chimni, B.S. "Capitalism, Imperialism, and International Law in the Twenty-First Century" (2012) 14 *Oregon Review of International Law* 17.
- Chimni, B.S. "Customary International Law: A Third World Perspective" (2018) 112:1 *American J Intl L* 1.
- Chimni, B.S. "The Past, Present and Future of International Law: A Critical Third World Approach" (2007) 8 *Melbourne Journal of International Law* 499.
- Chimni, B.S. "The Past, Present and Future of International Law: A Critical Third World Approach" (2007) 8 *Melbourne Journal of International Law* 499.
- Chimni, B.S. "Third World approaches to International Law: A Manifesto" (2006) 8:3 *International Community Law Review* 3.
- Cox, Gary. "The Clean Development Mechanism as a Vehicle for Technology Transfer and Sustainable Development – Myth or Reality" (2010) 6 *Law, Environment and Development Journal* 179.
- Creutzig, Felix et al. "Beyond Technology: Demand-Side Solutions for Climate Change Mitigation" (2016) 41:1 *Annu Rev Environ Resour* 173.
- Dechezlepr, Antoine et al. "The North-South Transfer of Climate-Friendly Technologies through the Clean Development Mechanism" (2007) October *Int Aff.*, 8.
- Devlin, Richard. "The Charter and Anglophone Legal Theory" (1997 - 1998) 4:1 *Rev of Const Stud* 19.
- Drahos, Peter. "The Regulation of Public Goods" (2004) 7:2 *J Intl Economic L* 321.
- Eberle, Edward. "The Method and Role of Comparative Law" (2009) 8:3 *Washington University Global Studies Law Review* 451.
- Eslava, Luis & Sundhaya Pahuja. "Between Resistance and Reform: TWAIL and the Universality of International Law" (2011) 3:1 *Trade, Law & Dev* 103.
- Fisher, Elizabeth et al, eds., "Maturity and Methodology: Starting a Debate about Environmental Law Scholarship" (2009) 21:2 *Journal of Environmental Law* 213.
- Gathii, James. "TWAIL: A brief History of Its Origins, Its Decentralized Network, and a Tentative Bibliography" (2011) 3:1 *Trade Law & Development* 26.
- Goeminne, Gert & Erik Paredis. "The Concept of Ecological Debt: Some Steps Towards an Enriched Sustainability Paradigm" (2010) 12 *Env. Dev. Sust.* 691.
- Goodrick, Delwyn. "Comparative Case Studies" (2014) 9 *Methodological Briefs: Impact Evaluation, UNICEF Office of Research* 1.
- Haskell, John. "TRAIL-ing TWAIL: Arguments and Blind Spots in Third World Approaches to International Law" (2014) 27:2 *Canadian Journal of Law and Jurisprudence* 1.
- Heleen De Coninck, Frauke Haake & Nico Van Der Linden. "Technology transfer in the Clean Development Mechanism" (2007) 7:5 *Clim Policy* 444.

Hilson, Chris. "It's All About Climate Change, Stupid! Exploring the Relationship Between Environmental Law and Climate Law" (2013) 25:3 *Journal of Environmental Law* 359.

Hutchinson, Cameron. "Does TRIPS Facilitate or Impede Climate Change Technology Transfer into Developing Countries?" (2006) 3 *University of Ottawa Law & Technology Journal*, 1.

Ikenberry, John. "The Future of the Liberal World Order: Internationalism After America" (2011) May-June *Foreign Affairs* at 56.

Kaarbo, Juliet & Ryan Beasley. "A Practical Guide to the Comparative Case Study Method in Political Psychology" (1999) 20:2 *Political Psychology* 369.

Karani, P. "Technology transfer to Africa-Constraints for CDM operations" (2002) 3:3 *Refocus* 20.

Khumalo, Njabulo & Charity Baloyi. "African Indigenous Knowledge: An Underutilised and Neglected Resource for Development" (2017) *Library Philosophy and Practice (e-journal)* online: <<https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=4727&context=libphilprac>> 1663.

Knight, Carl. "Climate Change and the Duties of the Disadvantaged: Reply to Caney" (2011) 14:4 *Critical Review of International Social and Political Philosophy* 531.

Knox, John. "The Myth and Reality of Transboundary Environmental Impact Assessment" (2002) 96:2 *AJIL* 291.

Kreibich, Nicolas et al. "An update on the Clean Development Mechanism in Africa in times of market crisis" (2017) 9:2 *Clim Dev* 178.

Lai, Brian. "Examining the Goals of US Foreign Assistance in the Post-Cold War Period, 1991 - 1996" (2003) 40:1 *Journal of Peace Research* 103.

Larson, Eric Thomas. "Why Environmental Liability Regimes in the United States, the European Community and Japan have grown Synonymously with the Polluter Pays Principle" (2005) 38 *Vanderbilt Journal of Transnational Law* 541.

Lazarus, Richard. "Super Wicked Problems and Climate Change: Restraining the Present to Liberate the Future" (2009) 94 *Cornell L Rev* 1153.

Maskus, Keith & Jerome Reichman. "The Globalization of Private Knowledge Goods and the Privatization of Global Public Goods" (2004) 7(2) *Journal of International Economic Law* 279.

Micale, Valerio, Chiara Trabacchi & Leonardo Boni, "Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya" (2015) *Climate Policy Initiative*, online: <http://climatepolicyinitiative.org/wp-content/uploads/2015/06/150601_Final_Olkaria_ForWeb.pdf>.

Michaelowa, Axel & Frank Jotzo. "Transaction costs, institutional rigidities and the size of the clean development mechanism" (2005) 33:4 *Energy Policy* 511.

Mickelson, Karin. "Leading Towards a Level Playing Field, Repaying Ecological Debt, or Making Environmental Space: Three Stories about International Environmental Cooperation" (2005) 43:1/2 *Osgood Hall Law Journal* 137.

Mickelson, Karin. "Rhetoric and Rage: Third World Voices in International Legal Discourse" (1998) 16:2 *Wisconsin International Law Journal* 353.

Mickelson, Karin. "Taking Stock of TWAIL Histories" (2008) 10 *International Community Law Review* 355.

Morales, Ivan. "Balancing Intellectual Property Rights and Clean Technology Development: Encouraging Cooperation" (2017) 17 *Houston Journal of Health Law and Policy* 405.

Moser, Petra. "Patents and Innovation in Economic History" (2016) 8 *Annual Review of Economics* 241.

Mukeu, Pharis & Reuben Langat. "Olkaria (Kenya) Geothermal Project Case Study" (2016) 40 *GRC Transactions* 85.

Mutua, Makau. "What is TWAIL?" (2000) 94 *American Society of International Law Proceedings* 31.

Natarajan, Usha. "TWAIL and the Environment: The State of Nature, the Nature of the State, and the Arab Spring" (2012) 14 *Oregon Review of International Law* 177.

- Ockwell, David & Rob Byrne. "Improving Technology Transfer through National Systems of Innovation: Climate Relevant Innovation-System Builders (CRIBS)" (2016) 16:7 *Climate Policy* 836.
- Ockwell, David et al. "Intellectual Property Rights and Low Carbon Technology Transfer: Conflicting Discourses of Diffusion and Development" (2010) 20 *Global Environmental Change* 729.
- Okafor, Obiora. "Newness, Imperialism, and International Legal Reform in Our Time: A TWAIL Perspective" (2005) 43:1/2 171.
- Olawuyi, Damilola. "Achieving Sustainable Development in Africa through the Clean Development Mechanism: Legal and Institutional Issues Considered" (2009) 17:2 *African J Int Comp Law* 270.
- Olawuyi, Damilola. "From Technology Transfer to Technology Absorption: Addressing Climate Change Technology Gaps in Africa" (2017) *Journal of Energy & Natural Resources Law*, DOI: 10.1080/02646811.2017.1379667.
- Orgad, Liav. "The Preamble in Constitutional Interpretation" (2010) 8 *Intl J of Const L* 714.
- Page, Edward. "Give it up for Climate Change: A Defence of the Beneficiary Pays Principle" (2012) 4:2 *International Theory* 300.
- Pathak, R.S. & Akshay Jaitly. "Rio Declaration – Economic Issues for Developing Countries" (1992) 1:3 *Review of European Community & Intl Environmental Law* 267.
- Phillips, Jim. "Why Legal History Matters" (2010) 41 *Victoria University Wellington Law Review* 293.
- Pongiglione, Francesca & Jan Cherlet. "The Social and Behavioral Dimensions of Climate Change: Fundamental but Disregarded?" (2015) 46:2 *J Gen Philos Sci* 383.
- Rajagopal, Balakrishnan. "International Law and Its Discontents: Rethinking the Global South" (2012) 106 *American Society of International Law Proceedings* 176.
- Rajagopal, Balakrishnan. "Locating the Third World in Cultural Geography" (1999) 15:2 *Third World Legal Studies* 1.
- Rajamani, Lavanya. "Ambition and Differentiation in the 2015 Paris Agreement: Interpretative Possibilities and Underlying Politics" (2016) 65 *International and Comparative Law Quarterly* 493.
- Rajamani, Lavanya. "The Changing Fortunes of Differential Treatment in the Evolution of International Environmental Law" (2012) 88:3 *International Affairs* 605.
- Reddy, NMohan et al. "International technology transfer: A review" (1990) 19:4 *Res Policy* 285, online: <http://inkinghub.elsevier.com/retrieve/pii/004873339090015X>.
- Reisman, A. & Stephen Seres. "Analysis of Technology Transfer in CDM Projects: Report for the UNFCCC Registration & Issuance Unit CDM/SDM" (2007) 33 *Omega* 189.
- Ricupero, Rubens. "Chronicle of a Negotiation: The Financial Chapter of Agenda 21 at the Earth Summit" (1993) 4 *Colorado J Intl Envntl L* 81.
- Rocha, Marcia et al. "Historical Responsibility for Climate Change – From Countries Emissions to Contribution to Temperature Increase" (November 2015) *Climate Analytics* 8.
- Schneider, Malte, Andreas Holzer & Volker H Hoffmann. "Understanding the CDM's contribution to technology transfer" (2008) 36:8 *Energy Policy* 2920.
- Seck, Sara. "Business Responsibilities for Human Rights and Climate Change – A Contribution to the Work of the Study Group on Business and Human Rights of the International Law Association" (2017) online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2974768.
- Seck, Sara. "Business, Human Rights, and Canadian Mining Lawyers" (2015) 56 *Canadian Business Law Journal* 208.
- Seo, S. Niggol. "A Theory of Global Public Goods and their Provisions" (2016) 16:4 *Journal of Public Affairs* 394.
- Serdeczny, Olivia et al. "Climate Change Impacts in Sub-Saharan Africa: from Physical Changes to their Social Repercussions" (2015) 15:8 *Regional Environmental Change*, 1.

- Shishlov, Igor & Valentin Bellassen, “10 Lessons form 10 Years of the CDM” (2012) 37 Climate Report 29.
- Simonet, Henry. “Energy and the Future of Europe” (1975) Foreign Affairs 454.
- Situmbeko, Shadreck. “Decentralised Energy Systems and Associated Policy Mechanisms – A Review of Africa” (2017) 7 Journal of Sustainable Bioenergy Systems 98.
- Tarlock, A. Dan. “Is There a There There in Environmental Law” (2004) 19 J Land Use & Envl L 213.
- Torrance, Andrew. “Patent Expertise and the Regress of Useful Arts” (2009) 33 Southern Illinois University Law Journal 239.
- Urban, Frauke, Sam Geall and Yu Wang. “Solar PV and Solar Water Heaters in China: Different Pathways to Low Carbon Energy” (2016) 64 Renewable and Sustainable Energy Reviews 531.
- Urban, Frauke. “China’s Rise: Challenging the North – South Technology Transfer Paradigm for Climate Change Mitigation and Low Carbon Energy” (2018) 113 Energy Policy 320.
- Van Hoecke, Mark. “Methodology of Comparative Legal Research” (2015) Law and Method 2.
- Wara, Michael. “Measuring the Clean Development Mechanism’s Performance and Potential” (2008) 55:6 UCLA Law Rev 1759.
- Warnecke, Carsten, Thomas Day & Noémie Klein. “Analysing the status quo of CDM projects: Status and prospects” (2015) May Ger Fed Minist Environ Nat Conserv Build Nucl Saf 140, online: <<http://newclimate.org/2015/05/16/analysing-the-status-quo-of-cdm-projects/>>.
- Whelan, Daniel. “Under the Aegis of Man”: The Right to Development and the Origins of the New International Economic Order” (2015) 6:1 Humanity: An Intl J of Human Rights, Humanitarianism and Development 93.
- Williams, Mariama & Manuel Montes. “Common but Differentiated Responsibilities: Which Way Forward?” (2016) 59 Development 114.
- Wytze van der Gaast, Katherine Begg & Alexandros Flamos. “Promoting sustainable energy technology transfers to developing countries through the CDM” (2009) 86:2 Appl Energy 230.

Working Papers

- Godard, Olivier. “Ecological Debt and Historical Responsibility Revisited – The Case of Climate Change” (2012) EUI Working Paper RSCAS 2012/46
- Pueyo, Ana & Pedro Linares. *Renewable Technology Transfer to Developing Countries: One Size Does Not Fit All* (2012) 412 IDS Working Paper.
- Warlenius, Richard. “In Defence of Climate Debt Erhics: A Response to Olivier Godard” (2013) 5 Working Papers in Human Ecology (Lund University).
- Working Group III Contribution to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. *Climate Change 2007: Mitigation of Climate Change*, (Cambridge: Cambridge University Press, 2007) 218

Research Papers

- Abdel-Latif, Ahmed et al. “Overcoming the Impasse on Intellectual Property and Climate Change at the UNFCCC: A Way Forward” (2011) 11 ICTSD 3
- Abdel-Latif, Ahmed. (2015) Intellectual property rights and the transfer of climate change technologies: issues, challenges, and way forward, *Climate Policy*, 15:1, 103-126, DOI: 10.1080/14693062.2014.951919.
- Abdel-Latif, Ahmed. “The Climate Technology Mechanism: Issues and Challenges” (2011) Information Note Number 18 ICTSD
- Aoki, Chizuru, et al. *Implementing the Poznan Strategic and Long-Term Programs on Technology Transfer*, (GEF, 2012)

Barton, John. “Intellectual Property and Access to Clean Energy Technologies in Developing Countries: An Analysis of Solar Photovoltaic, Biofuel and Wind Technologies” (2007) 1 ICTSD Programme on Trade and Environment Issue Paper, 13.

Brandi, Clara et al, “Intellectual Property Rights as a Challenge to Providing Global Public Goods: The Cases of Public Health, Food Security and Climate Stability” (2010) 17 Discussion Paper, German Development Institute

Centre for Indigenous Environmental Resources, “How Climate Change Uniquely Impacts the Physical, Social and Cultural Aspects of First Nations” (2006) <https://www.afn.ca/uploads/files/env/report_2_cc_uniquely_impacts_physical_social_and_cultural_aspects_final_001.pdf>

Contreras, Jorge L, Bronwyn H Hall & Christian Helmers. “Assessing the Effectiveness of the Eco-Patent Commons: A Post-mortem Analysis” (2018) 161 CIGI Pap, online: [https://www.cigionline.org/sites/default/files/documents/Paper no.161_3.pdf](https://www.cigionline.org/sites/default/files/documents/Paper%20no.161_3.pdf)>

Griffin, Paul. “The Carbon Major Database CDP Carbon Majors Report 2017” (2017) CDP Report

Harvey, Ian. “Intellectual Property Rights: The Catalyst to Deliver Low Carbon Technologies” (2008) Breaking the Climate Deadlock Briefing Paper.

Heede, Richard, Carbon Majors: Accounting for Carbon and Methane Emissions 1854 – 2010 Methods and Results Report (Colorado: Climate Mitigation Services, 2014)

IPCC, *Methodological and Technological Issues in Technology Transfer* (Cambridge: Cambridge University Press, 2000)

Koskeniemi, Martti et al. “Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law” Report of the Study Group of the International Law Commission, ILC 58th Sess., A/CN.4/L.682

Maskus, Keith & Ruth Okediji. “Intellectual Property Rights and International Technology Transfer to Address Climate Change” (2010) ICTSD Issue Paper No. 32

Mbeva, Kennedy Liti & Pieter Pauw, “Self-Differentiation of Countries’ Responsibilities: Addressing Climate Change through Intended Nationally Determined Contributions” (2016) 4 Discussion Paper, German Development Institute, 19

Pauw, Pieter *et al.* “A State-of-the-Art Review of the Notion of Common but Differentiated Responsibilities in International Negotiations” (2014) 6 German Development Institute Discussion Paper

Pugatch, Meir Perez, *Intellectual Property & the Transfer of Environmentally Sound Technologies*, (Global Challenges Report, WIPO: Geneva, 2011)

Sampath, Padmashree Gehl. “Can the Climate Technology Mechanism Deliver its Promise?” in Padmashree Sampath, J. Mugabe & J. Barton, *Realizing the Potential of the UNFCCC Technology Mechanism: Perspectives on the Way Forward* (Geneva: ICTSD, 2012)

Tirpak, Dennis & Jo-Ellen Parry. “Financing Mitigation and Adaptation in Developing Countries: New Options and Mechanisms”, (2009) Background Paper, online: <https://www.iisd.org/pdf/2009/financing_mitigation_new_options.pdf>

UNCTAD, *State of South-South and Triangular Cooperation in the Production, Use and Trade of Sustainable Biofuels*, (Geneva, UNCTAD; 2012)

UNEP, *Patents and Clean Energy Technologies in Africa* (UNEP, 2013)

UNFCCC, “Innovative Options for Financing the Development and Transfer of Technologies”, (2007) online: https://unfccc.int/resource/docs/publications/innovation_eng.pdf

UNFCCC, “The Contribution of the Clean Development Mechanism under the Kyoto Protocol to Technology Transfer” (2010) online: <<https://cdm.unfccc.int/Reference/Reports/TTreport/TTrep10.pdf>>

UNFCCC, *Technologies for Adaptation to Climate Change* (Bonn: UNFCCC, 2006)

United Nations Environment Programme, “Patents and Clean Energy: Bridging the Gap Between Evidence and Policy – Final Report” (UNEP, 2010)

Watson, Robert T, Marufu C Zinyowera & Richard H Moss. *Technologies, Policies and Measures for Mitigating Climate Change: IPCC Technical Paper I* (IPCC, 1996)

WIPO, *World Intellectual Property Indicators 2017* (Geneva, WIPO; 2017)

Electronic Sources

Christiana Figueres, former Secretary General to the United Nations Framework Convention on Climate Change (UNFCCC) quoted by Catherine Suez, “Human Survival Depends on Shared Technology, Says New UN Climate Chief” *Intellectual Property Watch* (3 September 2010) online: <https://www.ip-watch.org/2010/09/03/human-survival-depends-on-technology-says-new-un-climate-chief/>.

Amadou Sy, “Africa: Financing Adaptation and Mitigation in the World’s Most Vulnerable Region” (2016) online: https://www.brookings.edu/wp-content/uploads/2016/08/global_20160818_cop21_africa.pdf

“United Nations Fact Sheet on Climate Change”
online: http://unfccc.int/files/press/backgrounders/application/pdf/factsheet_africa.pdf

International Energy Agency, *Africa Energy Outlook: A focus on Energy Prospects in Sub-Saharan Africa*, (2014). online: https://www.iea.org/publications/freepublications/publication/WEO2014_AfricaEnergyOutlook.pdf

Michael Shellinberger & Ted Nordhaus, “The Death of Environmentalism: Global Warming Politics in a Post-Environmental World” (2004) online: https://www.thebreakthrough.org/images/Death_of_Environmentalism.pdf

Valentina Vadi, “International Law and Its Histories: Methodological Risks and Opportunities” online: http://eprints.lancs.ac.uk/84947/1/Histories_Harvard_Vadi.pdf

UNEP, “Environmentally Sound Technologies for Sustainable Development” (21 May 2003) online: http://www.unep.or.jp/ietc/techTran/focus/SustDev_EST_background.pdf

United Nations Department of Economic and Social Affairs (UNDESA), “Climate Change: Technology Development and Technology Transfer” Prepared for the Beijing High-Level Conference on Climate Change: Technology Development and Technology Transfer Beijing, China, 7 – 8 November 2008, online: https://sustainabledevelopment.un.org/content/documents/1465back_paper.pdf

Tim Buckley et al, China 2017 Review: World’s Second-Biggest Economy Continues to Drive Global Trends in Energy Investment, (January 2018) online: <http://ieefa.org/wp-content/uploads/2018/01/China-Review-2017.pdf>

Energy Business Review, “Top Wind Turbine Companies” (7 July 2017) online: <http://wind.energy-business-review.com/news/top-wind-turbine-companies-5864985>

UNDP, “Frequently Asked Questions: South-South and Triangular Cooperation” (2014) online: http://www.undp.org/content/dam/undp/library/Poverty%20Reduction/Development%20Cooperation%20and%20Finance/SSC_FAQ%20v1.pdf

UNFCCC, “Climate Change does not respect national borders”, UN chief Ban Ki-moon”, (29 November 2015), online: <https://unfccc.int/news/video-climate-change-does-not-respect-national-borders-un-chief-ban-ki-moon>

“U.S. will Pay into Climate Fund, but not Reparations: Todd Stern”, Reuters, (9 December 2009) online: <https://www.reuters.com/article/us-climate-copenhagen-stern/u-s-will-pay-into-climate-fund-but-not-reparations-todd-stern-idUSTRE5B82R220091209>

“U.S. – China Joint Announcement on Climate Change” (12 November 2014) online: <https://obamawhitehouse.archives.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change>

G77 and China, “Statement on Behalf of the Group of 77 and China at the Closing Plenary of the 47th Session of the Subsidiary Body for Scientific and Technological Advice and the 47th Session of the Subsidiary Body of Implementation (Bonn, Germany, 15 November 2017)” online: <<http://www.g77.org/statement/getstatement.php?id=171115>>

“India’s Intended Nationally Determined Contribution” online: <<http://www4.unfccc.int/ndcregistry/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf>>.

Marcos Orellana, et al, “Technology Transfer in the UNFCCC and Other International Legal Regimes: The Challenge of Systemic Integration” (2010) online: <http://www.ichrp.org/files/papers/184/138_technology_transfer_UNFCCC.pdf>

OPEC, “Brief History of OPEC” online: <http://www.opec.org/opec_web/en/about_us/24.htm>

Ian Mann, “Shaky Industry that Runs the World”, TIMES, (24 January 2010) online: <<http://archive.li/ZOHoz>>

“Origin of the Group of 77”, online: <<http://www.g77.org/paris/history/pdf/historyG77.pdf>>

“About TT: CLEAR”, online: <<http://unfccc.int/ttclear/about>>

Implementing the Poznan Strategic and Long-Term Programs on Technology Transfer, (2012) online: <https://www.thegef.org/sites/default/files/publications/GEF_PoznanTT_lowres_final_2.pdf>

“The Climate Technology Mechanism: Issues and Challenges”, (2011) ICTSD Information Note Number 18, online: <<https://www.ictsd.org/downloads/2011/04/technologymechanism.pdf>>

Philip Elmer-Dewitt, “Summit to Save the Earth: Rich vs. Poor”, TIME Magazine, (1 June 1992) online: <<http://content.time.com/time/magazine/article/0,9171,975656-9,00.html>>

Samuel Bar-Zakay, “Technology Transfer Model” (1970) online: <<https://www.rand.org/pubs/papers/P4509.html#download>>

K, Ramanathan, “An Overview of Technology Transfer and Technology Transfer Models” online: <http://tto.boun.edu.tr/files/1383812118_An%20overview%20of%20TT%20and%20TT%20Models.pdf>

Bojan Pretnar, “Commercialism of Patents and Know-how: From Academia to Industry” online: <<http://www.uil-sipo.si/uploads/media/Pretnar.pdf>>

UNEP DTU Partnership, Centre on Energy, Climate and Sustainable Development, “CDM Projects by Host Region” online: <<http://cdmpipeline.org/cdm-projects-region.htm#1>>

CDM-PDD, online: <https://cdm.unfccc.int/filestorage/T/2/N/T2N9G73GCSUW91EJUE7BJRW9NGIOLU/Final%20PDD-Nigeria%20_03_08_06.pdf?t=ZW18cDlrczI4fDBY_RNGHjM1sGG7-BDb40Rk>

CDM-PDD, online: <https://cdm.unfccc.int/filestorage/l/z/23VFX68ADZ9LMN1RU4WPEIOSYGB5H7.pdf/130218_Nigeria_PDD_for_m02_v03_PRC_clean.pdf?t=cGZ8cDlrczNvfDCDZ4BK_LnO1aRahYEbZWq6>

“The Stove 80 woodstove and wonder box” online: <<http://www.unepfi.org/fileadmin/events/2011/lagos/Save80CDMProjectPart2.pdf>>

Paul Kramer, “A Highly Efficient Fuel Wood Stove – The Save 80 in Kaduna, Nigeria” online: <www.l-h-l.org/?download=highly_efficient_%20stove_Save80.pdf>

The Partnership for Clean Indoor Air, “The save 80 Efficient Fuelwood Stove for Nigeria”, online: <<http://www.pciaonline.org/projects/save-80-efficient-fuelwood-stove-nigeria>>

F-CDM-PDD, online:

<<https://cdm.unfccc.int/filestorage/o/q/LTE4YOD03G6N5CX8HRZUA9SKJP2VMB.pdf/P%20081112%20Final%20Obodugwa%20PDD%20public%20vers.pdf?t=aDN8cDlrczV0fDA7KGIwt8H3E0gZicDMTnEt>>

https://cdm.unfccc.int/filestorage/F/6/0/F605JS3OBCM4TL9QWENA8DGI1PZUX2/Ngong_I05_03_2014.pdf?t=OUd8cDlsYWRvfDBHCDaTWN2cXYAvaAFkcuNW>

<<https://cdm.unfccc.int/filestorage/x/u/XWRFESV1D0G6B8YZ7POL4HMIN29Q35.pdf/PDD.pdf?t=Y0R8cDlsYWVkfDBfPsMJFo1BDzL9-cL9tfy8>>

<<https://cdm.unfccc.int/filestorage/Q/4/K/Q4K589JXEA6SUZYBHDVMPN2O1FL3T7/Final%20PDD.pdf?t=QnN8cDlseXhzfDCQmeua04NwYHL5mcZcu3ud>>

The South African DNA Project Approval Process” online:
<<http://www.energy.gov.za/files/esources/kyoto/dnaapproval.pdf>>

<https://cdm.unfccc.int/filestorage/V/I/8/VI8FSDOYEMJ4KZNB3L6CH52W0A7GQR/2017-07-13%20Beatrix%20Updated%20PDD_Clean.pdf?t=Whp8cDlseTNufDAI3WiwEEVSNliyxcQqmKd4>

“Manufacture and Utilization of Bio-coal Briquettes in Stutterheim, South Africa” online:

<<https://cdm.unfccc.int/filestorage/Q/4/K/Q4K589JXEA6SUZYBHDVMPN2O1FL3T7/Final%20PDD.pdf?t=QnN8cDlseXhzfDCQmeua04NwYHL5mcZcu3ud>>

North west, KwaZulu-Natal & Eastern Cape CFL Replacement Project, online:
<https://cdm.unfccc.int/filestorage/v/m/LKNG357QMSJYE1DXU9T0V4F8PBCAZ6.pdf/7356-PDD_%2011Dec2012.pdf?t=ZTN8cDlseTM1fDBz44g5Y880W8-DSBsB4yNX>

Gauteng, Free State, Mpumalanga, Limpopo & Northern Cape CFL Replacement Project (1) in South Africa, online:

<https://cdm.unfccc.int/filestorage/k/w/DAHR6T07C5LQGFU83SMWIXJN4YE9P2.pdf/7478%20PDD%20%2027%20Sep%2012.pdf?t=YmN8cDlseTNpfDAeLz_kUMYtPPf7xyKF5_mv>

“Ekurhuleni Landfill Gas Recovery Project – South Africa” online: <
<https://cdm.unfccc.int/filestorage/B/I/1/BI1J2FD6T0PKNW7RLX5HOQGSZAEM8V/EMM%20Revised%20PD D%2020140814.pdf?t=a1Z8cDlseTN1fDCjHKz4JtuZpmZUdL0W1gxx>>

Dassieklip Wind Energy Facility in South Africa, online: <
<https://cdm.unfccc.int/filestorage/y/9/5BTD39216KFPELGAMQO7JZ4YIXCWHR.pdf/8107-PDD-2012%2011%2009.pdf?t=TXh8cDlseTM5fDDfKxVuUkYqPvsvRHpOrflf>>

Bokpoort CSP (Concentrating Solar Power) Project, South Africa, online: <
https://cdm.unfccc.int/filestorage/8/T/X/8TXDP40YBUWE5RKOJCF2LI16MV3NH9/PA7841_Revised%20P DD_clean.pdf?t=R118cDlseTN1fDAayJEMoyDU4ld65NsTyQA9>

NREL, “Concentrating Solar Power Projects in South Africa” online:
<https://www.nrel.gov/csp/solarpaces/by_country_detail.cfm/country=ZA>

Gas Flare Recovery at Suez Oil Processing Company, Egypt, online:
<https://cdm.unfccc.int/filestorage/6/g/O9ZBX6LFAPYWQ2I1GN30VJ8ETU75KH.pdf/PDD_ver04.pdf?t=N0t8cDltN2NvfDAgqlqWUryFEGB90XZm-Tht>

N2O and NOX Abatement Project at KIMA Fertilizer Plant in Aswan (Egypt), online: <
<https://cdm.unfccc.int/filestorage/x/k/C82OWMZGI361NLARBE0XK45JDYQHVP.pdf/8668%20PDD.pdf?t=Tm98cDltN2NhfDDdeRsa9o6x-GP-zjQKYJ2x>>

N2O and NOX Abatement Project at Delta ASMEDA Fertilizer Plant in Al Mansoura (Egypt), online:
<

<https://cdm.unfccc.int/filestorage/w/4/PLBNSXO9Q57DI4Y0K8E613CJRHWFM2.pdf/9032%20PDD.pdf?t=NU58cDltN2NfDBLSASiu23GAViYN9BnbdHg>>

Reduction of N₂O emissions from the new nitric acid plant of Egypt Hydrocarbon Corporation at Ain Sokhna, online: <<https://cdm.unfccc.int/filestorage/i/u/051G36BO298SLMZNTDFQVWRJUCHY7K.pdf/7606-PDD-5%20Oct%2012.pdf?t=VIB8cDltN2M0fDAIYJ2NH4KnHMNQkR1jcz7S>>

Zafarana KfW IV Wind Farm Project, Arab Republic of Egypt, online: <
https://cdm.unfccc.int/filestorage/Q/D/K/QDKWB96Z13XIGJ4V7MLCN5YRH8FASU/PDD_Zafarana%20KfW%20IV%20Wind%20Farm%20Project_Ver.02.1_clean?t=U0l8cDltN2JyfDDGany_8VsTjlGEh2pIGJxu>

Zafarana 8 – Wind Power Plant Project, Arab Republic of Egypt, online: <
<https://cdm.unfccc.int/filestorage/n/v/04TRBEU1HCZIJFA27N9O6YMVXKQSD.pdf/Revised%20PDD%20ver8%20-Clean.pdf?t=eEZ8cDltN2J5fDDbg94vsPhz8kcHqhxIfMal>>

“The GEF Solarchill Project” online: <<https://www.solarchill.org/english/about/>>

SolarChill Development, Testing and Technology Transfer Outreacg, GEF Project ID 4682, Project Identification Form, online: <
https://www.thegef.org/sites/default/files/project_documents/SolarChill%2520PIF%2520GEF_28092011_0.pdf
>

Wayne Balta, “Welcome to the Eco-Patent Commons” online: < <http://www.corporatecoforum.com/welcome-to-the-eco-patent-commons/> >

Kevin Greenleaf & Michael Byrne, “Triumph of the Eco-Patent Commons” (2011) 4 *Landslide* 43

“Decentralized Renewables: The Fast Track to Universal Energy Access” (2016) online: < https://static1.squarespace.com/static/532f79fae4b07e365baf1c64/t/578d7f206b8f5bebe7f47444/1468890916501/Power_for_All_POV_May2016.pdf >

“What is a Social Entrepreneur?” online: < <http://www.schwabfound.org/content/what-social-entrepreneur> >
United Nations Environment Programme (UNEP) - GREEN economy, “South-South trade in renewable energy: a trade flow analysis of selected environmental goods” (2014) 104, online: <
http://www.greengrowthknowledge.org/resource/south-south-trade-renewable-energy-trade-flow-analysis-selected-environmental-goods?utm_source=GGKP+Knowledge+Update,+Issue+2014-5&utm_campaign=GGKP+Knowledge+Update,+Issue+2014-4&utm_medium=email>

Arab Republic of Egypt, “Egyptian Intended Nationally Determined Contribution” online: < <http://www4.unfccc.int/ndcregistry/Pages/Search.aspx?k=egypt>>

“Technology Executive Committee: Strengthening Climate Technology Policies (Overview)” online: < <http://unfccc.int/ttclear/tec> >

Technology Executive Committee, “Technology Executive Committee: Performance Activities” (2017) online: <
http://unfccc.int/ttclear/misc/StaticFiles/gnwoerk_static/TEC_tab_1/ce6da98b6eb048dc9a4458bb08ddd502/eb5fa42ab8224402ad9a035520d7aeb3.pdf>

CTCN, “Draft Programme of Work” online: < <https://www.ctc-n.org/sites/www.ctc-n.org/files/f2137b4434244bdeafe3a24bad2c5273.pdf> >.

CTCN, “Climate Technology Centre and Network – Prioritization Criteria for Responding to Requests from Developing Country Parties” online: < <https://www.ctc-n.org/sites/www.ctc-n.org/files/240bcf259a814482a6b0b3d0f73932a4.pdf> >

CTCN, “Guiding Principles and Criteria for Establishment of the Climate Technology Network” online: <
<https://www.ctc-n.org/sites/www.ctc-n.org/files/fb910bb9b3394dff99a2be617f244ec4.pdf>>

Informal Note by the Co-Facilitators, (2017) online: < http://unfccc.int/files/meetings/bonn_nov_2017/in-session/application/pdf/sbsta47_6b_informal_note_v2.pdf>

Cambridge Advanced Learner's Dictionary & Thesaurus, online: < <https://dictionary.cambridge.org/dictionary/english/overarching>>

African Group Intervention on Capacity Building to the ADP Contact Group – 10 June 2014”, online: < https://unfccc.int/files/documentation/submissions_from_parties/adp/application/pdf/adp2-5_statement_by_south_africa_on_capacity_building_20140610.pdf>

GEF, “Transfer of Environmentally Sound Technologies: The GEF Experience” (2008) online: <https://www.thegef.org/sites/default/files/publications/GEF_TTbrochure_final-lores_3.pdf>

Hugo-Chavez Frias, “Speech Delivered at COP 15, United Nations Climate Summit, Copenhagen” on 16 December 2009, online: <<http://www.voltairenet.org/article163361.html>>.

“Climate Change: Michael Bloomberg Pledges \$4.5m for Paris Deal”, BBC News (23 April 2018) online: <<https://www.bbc.com/news/world-us-canada-43860590>>

Kurt M. Campbell et al, “The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change”, (2007) online: < https://csis-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/media/isis/pubs/071105_ageofconsequences.pdf>

Joshua Busby, “Climate Change and National Security: An Agenda for Action” (2007) online: < https://cfrd8-files.cfr.org/sites/default/files/report_pdf/ClimateChange_CSR32%20%281%29.pdf>

World Health Organization, “Protecting Health from Climate Change: Vulnerability and Adaptation Assessment” (2013) online: < http://apps.who.int/iris/bitstream/handle/10665/104200/9789241564687_eng.pdf?sequence=1&isAllowed=y>

Karl Marx, “The Fetishism of Commodities and the Secret Thereof” published online: < <https://web.stanford.edu/~davies/Symbsys100-Spring0708/Marx-Commodity-Fetishism.pdf>>

WHO, “Climate Change and Health” (2018) online: <<http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>>.

Met Office Hadley Centre and WFP, “Climate Impacts on Food Security and Nutrition: A Review of Existing Knowledge” (2012) online: <https://documents.wfp.org/stellent/groups/public/documents/communications/wfp258981.pdf?_ga=2.211052693.1804529180.1531217454-1159540535.1531217454>

Samuel Ogundipe, “Nigeria: Herdsmen Crisis – Presidency Blames Climate Change, Politicians – Explores Solution”, *Premium Times*, (8 July 2018) online: <<https://allafrica.com/stories/201807090020.html>>

“Lower Public R&D Spending and Protectionist Risks may pose a Threat to Innovation”, OECD (2016) online: <<http://www.oecd.org/innovation/lower-public-r-d-spending-and-protectionist-risks-may-pose-a-threat-to-innovation.htm>>

David Kline, “Do Patents Truly Promote Innovation”, *IPWatchdog* (2014) online: < <http://www.ipwatchdog.com/2014/04/15/do-patents-truly-promote-innovation/id=48768/>>.

“Apple Launches \$300 Million Green Energy Fund in China”, Reuters, (12 July 2018) online: <<https://www.reuters.com/article/us-apple-china/apple-launches-300-million-green-energy-fund-in-china-idUSKBN1K303D>>.

WTO, “Activities of the WTO and the Challenge of Climate Change” online: <https://www.wto.org/English/tratop_e/envir_e/climate_challenge_e.htm>