



# TECHNOLOGY FOR COMBATING CLIMATE CHANGE, PROPOSALS FOR TURKEY, PART I: THE TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGIES

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## **Executive Summary**

The transfer of environmentally sound technologies (ESTs) is universally recognized as one of the most effective ways to combat climate change.<sup>1</sup> These technologies contribute to our fight against climate change by lowering emissions and improving our resilience to climate change.<sup>2</sup> This series of papers will discuss the concept of ESTs, assess the compatibility of international laws and Turkish laws related to the transfer of ESTs, and propose new domestic laws and policies to create an environment conducive to their transfer. These proposals will also identify international projects, funds, mechanisms, and institutional frameworks that are available for Turkish actors to transfer ESTs. Since Turkey is planning to achieve its recently announced carbon-zero target by 2053,<sup>3</sup> this paper series aims at bringing much-needed awareness to the issue of EST transfer and proposing regulatory and practical remedies.

This paper is the first paper in the series and aims at setting the scene and clarifying the concept of the transfer of ESTs. First, the role of technologies in combating climate change is identified. Following this, the concept of ESTs and the transfer of ESTs are discussed. Subsequently, the relevant aspects of the United Nations (UN) climate change regime in the transfer of ESTs are outlined. The relevance of the international trading regime in the transfer of ESTs is then discussed. This paper argues that tension between the climate change and international trading regimes related to the transfer of ESTs will likely emerge. How Turkey can manage this tension and govern the issue domestically is the main question arising from the analysis. The last section provides a brief explanation of the future papers in this series, which will progressively answer this central question.

## 1) Domestic Policy Making for Combating Climate Change: Focusing on Technologies

Climate change is one of the most pressing issues of the last half century. The driving force behind climate change is the high concentration of greenhouse gases (GHG)<sup>4</sup> in the atmosphere causing increased temperatures and thereby severe adverse effects on all ecosystems.<sup>5</sup> The key question is how to tackle it globally.

A solution to a global issue like climate change must emanate from the auspices of international law and impact all relevant actors at all levels. Consequently, the issue was brought to the attention of states by the UN General Assembly (UNGA) in order to build an international consensus.<sup>6</sup> This led to the conclusion of the UN Framework Convention on Climate Change (UNFCCC) in 1992. The UNFCCC has 197 parties,<sup>7</sup> and all parties incur a broad obligation to combat climate change with the aim of keeping GHG concentrations in the atmosphere “at a level that would prevent dangerous anthropogenic interference with the climate.”<sup>8</sup> This was an important step, because when states (or countries<sup>9</sup>) incur obligations, they signal their commitment and intention to fulfill that obligation. This creates the expectation that these states would start working on fulfilling their legal obligation to combat climate change.<sup>10</sup> The Kyoto Protocol<sup>11</sup> and the Paris Agreement<sup>12</sup> were furthermore concluded accordingly by the UNFCCC parties to specify the broad obligation of the UNFCCC to combat climate change over different time periods. All these treaties, the Conference of Parties (COP) and other permanent treaty bodies to the UNFCCC, together constitute the UN climate change regime (referred to as the Regime hereinafter).

Due to states’ obligations to combat climate change under the Regime treaties, it is expected that states will implement domestic laws and policies to shape the behaviors of their industries and citizens in this regard. In other words, states need to demonstrate how to fulfill their obligations in practice. However, during the Kyoto Protocol period, there had been no adequate improvement in this regard for most countries.<sup>13</sup> The international obligation to combat climate change was not feasibly translated into do-

mestic laws and policies. To address this problem, the Paris Agreement was adopted with a design in which countries are able to consider their contribution to the Regime through nationally determined contributions (NDCs).<sup>14</sup> Every country determines their own commitment toward combating climate change in their NDCs, provided that these contributions align with the overall target of the Paris Agreement, “[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.”<sup>15</sup> Even though there are no sanctions in case of non-compliance with NDCs, preparing NDCs is obligatory for the parties to the Paris Agreement.<sup>16</sup> In other words, the Paris Agreement pushes every country to actually “plan” how to implement their commitments. This point is highly relevant for Turkey as it has recently ratified the Paris Agreement and pledged to make more ambitious NDCs to achieve net-zero emissions by 2053.<sup>17</sup> A detailed NDC is necessary for Turkey to illustrate how exactly it will achieve its targets. The subsequent paper in this series will critically analyze Turkey’s available legal, political, and practical tools relevant to combating climate change (e.g., the Turkish NDC, the Draft Code on Climate Change, the National Climate Change Strategy, and the National Climate Change Action Plan). Suggestions will be made for much-needed improvements and for future NDCs.

Toward the end of 2021, although most countries have shown their intentions to combat climate change, most of them have failed to sufficiently show how exactly they will implement their targets in practice.<sup>18</sup> By evaluating discussions from environmental and trade regimes, this paper series will argue that one of the main reasons for this situation is the complex relationship between the international trade regime and the climate change regime concerning “technologies.” To achieve the aforementioned 1.5°C target of the Paris Agreement,<sup>19</sup> GHG emissions should be decreased and ideally stopped.<sup>20</sup> When this aim is translated into practice, this mainly leads us to examine the role of technologies. Within the literature related to climate change, it is univocally agreed upon that technologies will “play a decisive role” in combating climate change.<sup>21</sup> The Intergovernmental Panel on Climate Change (IPCC) observes with “very high confidence” that the use of technologies can reduce GHG emissions and build resilience to the adverse effects

of climate change. For example, solar panel or wind turbine technologies could substitute energy from fossil fuels; energy efficiency technologies could substitute older energy-intensive technologies; the industrial machinery producing or processing substances could be substituted with machinery that is not polluting the environment and is more effective. It is necessary at this point to clarify what kinds of technologies are essential in our fight against climate change.

Technologies producing energy while emitting less GHG than conventional energy sources<sup>22</sup> or capturing or removing GHG from the atmosphere can play a significant role in this effort.<sup>23</sup> These technologies are referred to as “mitigation technologies.” Mitigation technologies could also be related to other carbon-intensive activities such as transportation, agriculture, and buildings.<sup>24</sup> Mitigation technologies do not, however, directly work on protecting us from the adverse effects of climate change such as sea level rise, drought, soil erosion, or increased poverty. There are also “adaptation technologies” that are helping nations to adapt to the adverse effects of climate change and decrease the vulnerability of ecosystems against climate change.<sup>25</sup> Together, mitigation and adaptation technologies are referred to as environmentally sound technologies (ESTs) under the UNFCCC.<sup>26</sup>

It is necessary to note here that the terminology used to refer to technologies under the Regime is evolving. The Paris Agreement and COP decisions, including the latest decision at COP 26 (i.e., the Glasgow Climate Pact), for example, only use the term “technology,” whereas the Technology Mechanism of the Regime uses both “climate technologies” and “ESTs.”<sup>27</sup> The aim of this paper is to analyze the scope of technologies that are relevant for combating climate change according to the Regime. In this regard, even though there are many other terms such as green technologies, climate technologies, or environmentally friendly technologies, the author adopts the concept of ESTs as it is used by the UNFCCC, the Conference of Parties, and other UN entities.<sup>28</sup> In a way, the term ESTs might become outdated at some point in the future; however, its scope will always be relevant in clarifying the range of technologies according to the Regime. Its scope is discussed further below.

## 2) The Concept of Environmentally Sound Technologies

The most widely accepted definition of ESTs is that adopted by the United Nations Conference on Environment and Development. ESTs are technologies that “protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes.”<sup>29</sup> This definition covers a wide range of technologies by including all technologies that are “less polluting,” relate to the sustainable use of “all resources,” or are better than their “substitutes.”

The Regime has adopted a maximally broad definition of ESTs.<sup>30</sup> The allocation of funding from the Regime for ESTs has been very diverse and encompasses renewables, energy efficient cooking facilities, technologies helping communities to be resilient against floods, zero-emission buses, improved fertilizers for securing food production, and even know-how about climate friendly financial development.<sup>31</sup> Technologies are understood according to their components, including knowledge, processes, software, and hardware.<sup>32</sup> In this regard, when the term ESTs is used by the treaty bodies of the Regime, it refers to a great deal of technologies.

Due to the broadness of this concept, it is not possible to find one common approach that could be applied to all technologies to decide whether they fall under the definition of ESTs.<sup>33</sup> For example, energy efficient technologies are emitting less GHG than older technology alternatives, but their energy efficiency varies drastically.<sup>34</sup> It is not easy to define what level of energy efficiency makes them “environmentally sound,”<sup>35</sup> and it is unclear who defines this level and how. The UN Environment Programme explains that ESTs are identified according to the perception and socio-economic conditions of the actors interacting with them.<sup>36</sup> In this regard, it is crucial to understand what ESTs are according to the laws, policies, and practice for Turkey. The subsequent paper of this series will investigate this question specifically.

The wide use of ESTs could significantly help in the fight against climate change. However, their use has been limited.<sup>37</sup> The innovation of, and the access to, ESTs varies drastically between countries, especially between developed and developing nations.<sup>38</sup> Their use mostly requires technology transfer between nations, since their innovation mostly occurs in developed countries and in some major developing countries such as China, India, and Brazil.<sup>39</sup> The “transfer of ESTs” between countries, especially between developed-developing and developing-developing states, has been a challenge that hampers efforts to combat climate change. Considering that combating climate change requires the global use of ESTs to shift the carbon-based production cycle to a low-carbon one, both developed and developing countries need to adopt ESTs.<sup>40</sup> This means that the transfer of ESTs between countries is crucial. Indeed, all Regime treaties include states’ obligations concerning the transfer of ESTs as discussed further in the paper.<sup>41</sup> Before delving into obligations, the concept of the transfer of ESTs is discussed below.

### 3) The “Transfer” of Environmentally Sound Technologies

As with the term ESTs itself, there is no uniform definition of what constitutes a transfer of ESTs. However, a widely accepted definition is provided by the IPCC and is also used by the Regime. It states that the transfer of ESTs is:

[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 [non-governmental organizations] and research/education institutions. It comprises the process of learning to understand, utilize, and replicate the technology, including the capacity to choose it, adapt it to local conditions, and integrate it with indigenous technologies.<sup>42</sup>

This definition includes the transfer of hardware components of technologies designated as “equipment,” software components designated as “know-how” and “experience,” and orgware components

that refer to “capacity building and development of “local conditions.”<sup>43</sup> This understanding corresponds to the aforementioned definition of ESTs under the Regime, which utilizes a broad understanding of the term ESTs.

The definition of transfer also shows that the transfer of ESTs is a process not only between states but also between the private sector, non-governmental organizations, financial institutions, research institutions, and other stakeholders of ESTs. This is because each transfer consists of several steps, starting from research and development and ending at sustaining and integrating ESTs within local conditions at the transfer location.<sup>44</sup> Each transfer of ESTs would pass through different phases and encounter different actors such as intellectual property rights owners, project funders, domestic institutions of the receiver country, the private sector, or even technical assistants from relevant bodies of the Regime (or other international institutions).<sup>45</sup>

Regime practices demonstrate that the transfer of ESTs refers to a vast number of diverse activities. When an international project is undertaken or funding is allocated for the transfer of ESTs under the Regime, it does not necessarily involve multiple phases or actors in the transfer of ESTs. Projects falling under the umbrella of EST transfer can be surprisingly diverse. As per the Financial Mechanism of the Regime, examples include training local engineers for the operation of a specific EST or a demonstration of that technology to overcome “public opposition” to the relevant EST.<sup>46</sup>

This diversity of projects and the lack of a clear understanding of what constitutes the transfer of ESTs in practice has created some degree of confusion.<sup>47</sup> Even though there are available funds and projects for the transfers, the adoption and the use of ESTs by countries have not substantially increased.<sup>48</sup> This is underlined by the fact that EST transfer projects relating to the reduction of GHGs do not occur at a level that could meaningfully contribute to combating climate change.<sup>49</sup> This is a serious issue especially for developing countries, which need to “use” and rely on ESTs since “many developing countries are in a phase of massive infrastructure build up. Delays in technology transfer could therefore lead to a lock-in in high-emissions systems for decades

to come.”<sup>50</sup> In addition to these, when a developing country transfers and learns from the transferred EST, this substantially contributes to the development of it as a return.<sup>51</sup> The transfer of ESTs is in a sense a development facilitator for developing countries.<sup>52</sup> Such transfers are therefore both essential for the fight against climate change and for development efforts. This point also links the concept of the transfer of ESTs to trade law, which is a crucial aspect of EST transfer.

The concept of the transfer of ESTs did not develop in a vacuum; it is highly influenced by, and still related to, international developments and trade law discussions about the concept of “the transfer of technologies.” In the 1960s and 1970s, the development of innovative technologies was seen as a key parameter for assessing the development level of a country.<sup>53</sup> Until countries could reach the development level that enabled them to create their own technologies—which is a lengthy process<sup>54</sup>—many countries (namely, those developing and least developed<sup>55</sup>) needed to rely on importing/transferring technologies from developed countries.<sup>56</sup> Nevertheless, the transfer of technologies has been seen as disadvantageous for developing countries, and developing countries’ dependence on technologies from developed countries has been seen as a development obstacle, especially in early debates on the subject.<sup>57</sup> Therefore, improving local conditions for innovation in developing countries became one of the key aspects in the discussions on the transfer of technologies.<sup>58</sup>

This aspect is also included in the concept of the transfer of ESTs. The IPCC emphasizes that “It [the transfer of technology] comprises the process of learning to understand, utilize, and replicate the technology, including the capacity to choose it, adapt it to local conditions, and integrate it with indigenous technologies.”<sup>59</sup> Improving conditions in any of the phases of the transfer of ESTs is considered a transfer by itself.<sup>60</sup> For example, the Regime funded some capacity-building projects in developing countries.<sup>61</sup> Even though those projects do not explicitly aim at transferring ESTs to other nations, they are considered projects for the transfer of ESTs. This is because they improve developing countries’ (or least developed countries’) capacity to access, use, or innovate ESTs.<sup>62</sup>

Overall, the transfer of ESTs is essential for the Regime and an important aspect in the international trading regime due its relevance to development. The transfer of ESTs is hence an area of overlap between the climate change and trade regimes. This point and its outcomes are analyzed further in Section 6. First, the relevance of the Regime and of the international trading regime to the transfer of ESTs is discussed.

#### **4) The Relevance of the United Nations Climate Change Regime for the Transfer of Environmentally Sound Technologies**

The transfer of “environmental technologies” was discussed as early as 1972 in the Declaration of the United Nations Conference on the Human Environment.<sup>63</sup> Following the debates about technologies related to environmental protection, many multilateral environmental agreements imposed obligations on their parties concerning the transfer of ESTs that are relevant to their subject matters, such as marine technologies.<sup>64</sup> Without a restriction on the subject matter, the UNFCCC imposed obligations on developed states to transfer ESTs to developing countries.<sup>65</sup> The core article of the UNFCCC on the transfer of ESTs is Article 4(5):

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, environmentally sound technologies and knowhow 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.

This article should be analyzed carefully. The article assigns the obligation of transferring ESTs to developed countries exclusively. The UNFCCC pro-

vides lists for differentiating developed countries. The first list is provided in Annex I, which covers 41 parties that were considered developed in the 1990s. Twenty-four of these parties—those considered most developed at the time—are also listed in Annex II. Turkey is listed in Annex I but has been removed from Annex II at its own request.<sup>66</sup> The reason behind this is that all obligations under the Regime treaties are given according to a formula that responds to debates regarding developed and developing countries in the transfer of ESTs. The literature outlines a “burden sharing formula”<sup>67</sup> that relies on two principles of the Regime “the principle of equity” and “the principle of common but differentiated responsibilities and respective capacities.”<sup>68</sup>

The principle of equity represents the overall idea of being equitable in dividing the burden of combating climate change.<sup>69</sup> The principle of common but differentiated responsibilities and respective capacities recognizes the diverse capacity of each country to tackle climate change.<sup>70</sup> Therefore, it does not expect all countries to tackle the adverse effects of climate change to the same degree. It differentiates between countries in accordance with their historical contribution to greenhouse gas emissions<sup>71</sup> and puts the burden on countries that historically polluted the most.<sup>72</sup> Developed countries have drawn energy from the combustion of fossil fuels, which are one of the main sources of GHG, for their industrial development since the Industrial Revolution.<sup>73</sup> Therefore, the main burden of climate change action is given to them.<sup>74</sup> Accordingly, developed countries are obliged to fulfill their commitments related to the transfer of ESTs. Developing countries are only encouraged to work toward this aim.<sup>75</sup>

Furthermore, under the Regime treaties developed countries are obliged to cover the costs of the transfer of ESTs to developing countries.<sup>76</sup> This is a key point since the transfer of ESTs can be very costly. In the energy sector, for example, a key effort in the fight against climate change is the substitution of fossil fuels with low-carbon energy production methods in all countries, in all industries, for all energy production methods. For each transfer, a technology is either acquired through local innovation, which has its own costs,<sup>77</sup> or through importing, which has operational costs and legal costs related to intellectual property rights (IPRs).<sup>78</sup> The selec-

tion of each technology is assessed in terms of its feasibility for the relevant situation.<sup>79</sup> These kind of assessments involve qualified people and include human costs.<sup>80</sup> Many states still need to adjust their domestic policies to make their domestic environment more suitable for the increased transfer of ESTs.<sup>81</sup> This point has been proven to be very challenging due to different obligations from different international agreements. Most states do not have the capacity to undertake country-level technology needs assessments, let alone craft policies for their facilitation.<sup>82</sup> In the case that an actual transfer takes place, the sustainability of the transferred ESTs also requires a certain level of investment, maintenance, and qualified personnel.<sup>83</sup> The International Energy Agency estimates that the cost of keeping the global temperature below 2°C by the end of the century requires an investment of USD 3.5 trillion annually in the energy sector alone.<sup>84</sup> Applying this to all mitigation and adaptation technologies, the value of the funds and projects can be better understood.<sup>85</sup> The following papers in this series will also explore available funds for the transfer of ESTs under the Regime and beyond.

This obligation is a good example of the compromises made by states while drafting the UNFCCC. Countries were divided into two camps: the developing countries insisted on an article with “concessional and preferential terms,” and the developed countries proposed an agreement suggesting a technology cooperation on “fair and favourable terms.”<sup>86</sup> The result of the discussions is Article 4(5) of the UNFCCC, which although binding does not indicate how the transfer of ESTs can or should occur. Developing countries achieved the use of the word “shall” to emphasize the binding character they insisted on; developed countries were able to avoid specific obligations for transferring ESTs.

Article 4(5) requires states to take “facilitative steps” for the promotion, facilitation, and financing of the transfer of ESTs as well as to support the development of national capacities and technologies of non-Annex I countries. This suggests that this article covers a wide range of activities. For example, assessing the technology needs of developing countries could be interpreted as promoting the transfer of ESTs or supporting the development of national capacities.<sup>87</sup> This broad coverage of transferring EST activities re-

sembles the IPCC definition of technology transfer that was discussed in the previous section.<sup>88</sup>

The obligation on the transfer of ESTs is repeated in both the Kyoto Protocol and the Paris Agreement.<sup>89</sup> The Paris Agreement, however, eliminates the strong division between Annex I and non-Annex I countries. The Paris Agreement uses the UNFCCC's burden-sharing formula and obliges developed parties to transfer ESTs.<sup>90</sup> The difference is that it does not reference the annexes of the UNFCCC. Rather, it uses the terms "developed"/"developing" countries.<sup>91</sup> Nevertheless, the UNFCCC Annexes are still applied to the allocation of Regime funding under the Paris Agreement.<sup>92</sup> The Paris Agreement, therefore, does not allow developed countries to avoid their ongoing obligations from other Regime treaties. This is designed to motivate more countries to take up the role of developed countries and undertake the transfer of ESTs and financing obligations. This is especially relevant for countries that have substantially developed since the 1990s.

At this point, it becomes clear that obligations on the transfer of ESTs under the Regime treaties are very broad. There are no specifications on how exactly and to what extent the transfers should happen. In order to identify means for such transfers, this paper series will explore best practices and will point out regulatory tools in this regard for Turkish policy makers.

Above, the Regime's approach to the transfer of ESTs is clarified by analyzing the relevant obligations to it. The international trading regime's approach to the transfer of ESTs is explored below.

## 5) The Relevance of the International Trading Regime for the Transfer of Environmentally Sound Technologies

The World Trade Organization (WTO) is the core organization of the international trading regime as it oversees the implantation of approximately 60 multilateral trade agreements (WTO Agreements).<sup>93</sup> Understanding the WTO and its influence on the transfer of ESTs is therefore essential.

The WTO was established as the successor to the General Agreement on Tariffs and Trade (GATT, 1947),<sup>94</sup> which provided the basis for "an unofficial, de facto international organization."<sup>95</sup> Therefore, even though the WTO was established in the 1990s, its operations and rules are rooted in the 1940s. In the 1960s, during the GATT period, discussions emerged about the significance of the transfer of technologies on the development of countries.<sup>96</sup> In the 1970s, the UN General Assembly saw technology transfer as a component to establish the "New International Economic Order."<sup>97</sup> This discussion about the new economic order began under the scope of international development and international trade law.<sup>98</sup> To accelerate the transfer of technologies between nations, the UN Conference on Trade and Development drafted the Draft International Code on the Transfer of Technology.<sup>99</sup> This draft agreement was not adopted, but efforts to impose obligations on states concerning the transfer of technologies continued under international trade law.<sup>100</sup> These efforts resulted in several references to the transfer of technologies in the WTO rules. However, only one of the 60 multilateral trade agreements annexed in the WTO's constitutive agreement uses obligatory language for technology transfers. The word "shall,"<sup>101</sup> which implies legal obligation in international law, is placed under the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs) Article 66(2): "Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base."<sup>102</sup>

The article above, however, imposes an obligation on providing incentives and not on transferring technologies.<sup>103</sup> Developed countries need to encourage enterprises and institutions to engage in technology transfer to least developed countries. Moreover, this article favors least developed countries, which are assessed and listed by the UN.<sup>104</sup> The restricted scope of the article on technology transfer from developed countries to least developed countries narrows its effects and leaves out developing countries. Additionally, this article is placed under the TRIPs Agreement, because there has been a debate about the relationship between the transfer of technologies and IPRs.<sup>105</sup> On the one hand, when this debate is adopted in the discus-

sions about ESTs, developing countries have argued that the IPRs on technologies restricted their access to ESTs.<sup>106</sup> On the other hand, developed countries have argued that IPRs protection is key and facilitates the transfer of ESTs and that the protection of IPRs should be strong and worldwide.<sup>107</sup> In other words, Article 66(2) of the TRIPS Agreement is again a compromise between developed and developing countries as it places a vague obligation on developed countries regarding technologies. At this point, it is important to underline that Article 66(2) of the TRIPS Agreement is about “all technologies” and not specifically ESTs. In fact, this situation is the result of the WTO’s trading principles, which should be explained to further the discussion of the point.

The WTO aims to reduce barriers to free trade,<sup>108</sup> which is a well-accepted source of development and economic growth.<sup>109</sup> To enable free trade and removing barriers to it, the WTO relies on two main principles for all its trade agreements: the most-favored-nation principle<sup>110</sup> and the national treatment principle.<sup>111</sup> These principles ensure that states will treat all imports and exports like “products” from all countries equally. The idea is as follows: If states do not institute disadvantages or advantages for certain countries and products, all products and services could be traded freely without any restriction. Concerning this approach, the WTO’s normative perspective in the 1990s concerning the issue of technologies was that if free trade is established through WTO Agreements, all necessary technologies could be transferred by market actors.<sup>112</sup> For example, smartphones were invented, and market actors played a major role in their global distribution. Since WTO rules apply to all kinds of technologies that are not necessarily concerned with the environment, such as smartphones or beauty products, attempts to oblige WTO members to transfer any kind of technologies have failed. As explained before, instead of obliging its parties to transfer technologies, the WTO obliged them to take facilitative steps to encourage their IPR holders to transfer technologies. Many economists argue that the WTO substantially contributes to the transfer of technologies—including ESTs—by removing barriers to trade.<sup>113</sup> This makes sense for the “trade” aspect of the issue; however, it considerably ignores the concerns and realities of environmental regimes. The conflict between climate change and trade regimes concerning the transfer of ESTs is discussed below.

## 6) The Conflict between the Climate Change Regime and the International Trading Regime on the Transfer of Environmentally Sound Technologies

The main reason why the solution to the climate change issue cannot be left to market forces alone is the sheer scale of the challenge. For example, a 45% cut of total global carbon emissions from 2010 levels by 2030 is necessary to contain the adverse effects of climate change on our planet.<sup>114</sup> Such a scale of action requires urgent and extensive transfers of ESTs between all nations, as ESTs are one of the most effective means to achieve scaled up emission cuts. As evidenced by the experience of prior decades, the market is currently not able to price in the externalities of the adverse effects of climate change, at least not at a sufficient scale. Speeding up this process requires domestic policies and support for stakeholders in the transfer of ESTs. By ignoring the special status of the transfer of ESTs for protecting the world’s ecosystems, the WTO has not only distanced itself from environmental concerns but also from the possible adverse effects of WTO Agreements on environmental policy. Indeed, “all regimes and institutions are ultimately linked by the fact that they operate within the realm of public international law.”<sup>115</sup> While the WTO Agreements regulated the transfer of technologies “with relative ignorance of legislative and institutional activities in the adjoining fields,”<sup>116</sup> they have impacted the governance of the transfer of ESTs. In fact, the WTO’s core principles of free trade and non-discrimination between countries and products make it challenging for parties to the Regime treaties to prioritize the transfer of ESTs among other technologies and for a certain group of countries over others.<sup>117</sup>

Because of the listing system the WTO has adopted, WTO Agreements indeed do not differentiate between carbon-intensive technologies and ESTs, which are both considered as products. The WTO uses the Harmonized System (HS) of the World Customs Organization for identifying products.<sup>118</sup> Countries representing 98% of world trade use this system.<sup>119</sup> The HS works by categorizing products in



four levels.<sup>120</sup> There are 21 main sections under the HS. Each section has chapters, and chapters are divided into headings, which are further divided into subheadings. For example, Section XVI, Chapter 85 covers “electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles.” Chapter 85 has several headings to divide products into groups, such as heading 8501 on electric motors and generators. Headings could have subheadings to provide more concise product groups. Heading 8501, for example, has subheadings such as 8501.10, which is about “motors of an output not exceeding 37.5 W.” Internationally, only one level of subheading is recognized, even though countries could add further sub-subheadings domestically.

Products falling under the same subheading (or heading) should be subjected to the same tariffs. Taking subheading 8501.10 as an example, all products falling under this category should be subjected to the same tariffs regardless of their environmental impact or production method. Within this system, it is problematic to differentiate ESTs from carbon energy technologies as the categorization does not create a distinction between them. There are several attempts to improve the HS in order to differentiate technologies according to their environmental impact.<sup>121</sup> The third paper in this series will analyze these attempts and discuss whether it is possible to manage the influence of the HS through domestic policy making (e.g., by adding sub-subheadings) for Turkey.

Under these circumstances, both the strategy of reducing tariffs on ESTs and the strategy of using tariffs to discourage the use of carbon-intensive technologies would be challenging for states. Indeed, the WTO Agreements further influence the policy measures of parties of the Regime treaties to transfer ESTs by treating all technologies equally.<sup>122</sup> The WTO has limits on tariffs and subsidies that restrict states in amending their laws to decrease the cost (e.g., border tariffs, subsidies) of the transfer of ESTs. This used to be a serious issue, since carbon-intensive technologies were cheaper than most ESTs, and ESTs had a disadvantage in international trade without policy support from states.<sup>123</sup> However, it should be added that the price

of renewables is becoming more competitive over time.<sup>124</sup> Considering that WTO Agreements affect the governmental conduct of all trade activities, including those regulating services, goods, IPRs, and investment, WTO rules emerge as a potential barrier to the implementation of the obligation of the Regime treaties on the transfer of ESTs. WTO laws would therefore introduce challenges for states regarding their compliance with the transfer of EST obligations under the Regime. This is already the case since the WTO, unlike the Regime, has a strong compliance mechanism.<sup>125</sup> One example of how WTO decisions can have devastating effects for budding EST markets is the *India-Solar Cells*<sup>126</sup> decision in which “[t]he WTO dispute has retarded the domestic solar manufacturing industry and destroyed their expansion plans.”<sup>127</sup> This allegation is admittedly very bold. However, even a major developing country’s attempts to create a viable technological base can be hindered with one decision of the WTO Dispute Settlement Body. This may well have a chilling effect on other developing countries hoping to follow India’s example and implement policies encouraging the development of national renewable industries. This situation illustrates how limited WTO members are in their domestic policy making.

This situation has an impact on all actors involved in the transfer of ESTs, since global governance of the issue influences domestic laws, and as a result domestic laws influence all other relevant actors in the transfer of ESTs. When the international law aspect of an issue is scattered, it is not realistic to expect states to be very bold in implementing relevant domestic laws, especially when there is a risk that these laws will be brought to the attention of the WTO Dispute Settlement Body.<sup>128</sup> In fact, many have shared concerns about domestic climate policies possibly violating WTO Agreements.<sup>129</sup> The question then remains how states can make enforceable domestic policies that do not violate WTO rules and promote the transfer of ESTs.

In an interview following the *India-Solar Cells* case, the Indian representative noted that they are struggling to find a balance between their obligations under the Regime and their policy making capacity due to WTO Agreements.<sup>130</sup> If they focus exclusively on their obligations under the Regime, there is a

risk of violating WTO rules. If WTO rules are strictly followed, making effective policies for fulfilling obligations under the Regime would be highly challenging. States need to find a balanced policy and gain access to available practical means to transfer ESTs. This paper series aims at providing advice in this regard, especially for Turkey. A list of the papers to appear in this series is provided below.

## **7) About This Series**

As the first paper in the series, this paper introduced the meaning and the importance of the transfer of ESTs for combating climate change. As will be further discussed in this paper series, the transfer of ESTs has legal and economic components that are highly dependent on each other. This can be seen from the fact that the Regime treaties use the language of “developing” and “developed” countries to differentiate obligations on the transfer of ESTs. This situation makes it very challenging for policy makers to address issues surrounding the transfer of ESTs. It is unclear whether states can fulfill their EST transfer obligations as outlined in Regime treaties without breaching their WTO obligations and develop as a result.

The question above is particularly relevant to Turkey due to its recently announced pledge to create a more ambitious NDC in order to reach its net-zero emissions target by 2053. In order to propose policies toward this end in Turkey, the following paper in this series will first analyze how Turkey currently approaches this issue legally and practically. This will narrow the scope of ESTs and make it a more workable topic for policy makers in Turkey. The third paper will identify relevant WTO Agreements and discuss possible regulatory tools for Turkey. The fourth paper will draw a roadmap for Turkish stakeholders in ESTs and identify available funds, mechanisms, projects, and other means available to them. Lastly, the paper series will conclude with a case study on the transfer of energy technologies between Germany and Turkey. Essentially, this paper series will develop a comprehensive analysis of the transfer of ESTs in Turkey including proposals for policy makers and a roadmap for all stakeholders in the transfer of ESTs.

## Notes

- 1 | Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report* (Geneva: IPCC, 2015), 26 and 94, [https://www.ipcc.ch/site/assets/uploads/2018/02/SYR\\_AR5\\_FINAL\\_full.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf).
- 2 | IPCC, *Methodological and Technological Issues in Technology Transfer: A Special Report of IPCC Working Group III* (Cambridge: Cambridge University Press, 2000), 3.
- 3 | Doğu Eroğlu, “Paris İklim Anlaşması Bugün Yürürlüğe Girdi: Türkiye’nin Eylem Planları Bekleniyor,” *Medyascope*, November 10, 2021, accessed November 11, 2021, <https://medyascope.tv/2021/11/10/paris-iklim-anlasmasi-bugun-yururluge-girdi-turkiyenin-eylem-planlari-bekleniyor/>.
- 4 | For the full list of greenhouse gases, IPCC, *IPCC Climate Change 2007: The Physical Science Basis* (Cambridge: Cambridge University Press, 2007), 212-13.
- 5 | See IPCC Reports I, II, III, IV, and V (VI will be available in 2022) for science-based global assessments, <https://www.ipcc.ch/reports/>.
- 6 | United Nations General Assembly, “Protection of Global Climate for Present and Future Generations of Mankind,” A/RES/43/53, December 6, 1988.
- 7 | “Status of Ratification of the Convention,” United Nations Climate Change, accessed November 11, 2021, <https://unfccc.int/process-and-meetings/the-convention/status-of-ratification/status-of-ratification-of-the-convention>.
- 8 | “United Nations Framework Convention on Climate Change,” adopted May 9, 1992, entered into force March 21, 1994, *United Nations Treaty Series* vol. 1771, p. 107, Art. 2.
- 9 | These terms are used interchangeably while respecting the established terminology of international law (e.g., member states or developing countries).
- 10 | This is the *pacta sunt servanda* principle that is also recognised by Article 26 of the “Vienna Convention on the Law of Treaties,” adopted May 23, 1969, entered into force January 27, 1980, *United Nations Treaty Series* vol. 1155, p. 331. See also, Anthony Aust, *Modern Treaty Law and Practice*, 2<sup>nd</sup> ed. (Cambridge: Cambridge University Press, 2007), 179-80.
- 11 | “Kyoto Protocol,” adopted December 11, 1997, entered into force February 16, 2005, *United Nations Treaty Series* vol. 2303, p. 148.
- 12 | “Paris Agreement,” adopted December 12, 2015, entered into force November 4, 2016, U.N.Doc.FCCC/CP/2015/L.9/Rev/1, <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>. For the United Nations Treaty Series data, see, [https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg\\_no=XXVII-7-d&chapter=27&clang=\\_en](https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-7-d&chapter=27&clang=_en).
- 13 | The Kyoto Protocol came into force in 2005. It established two commitment periods between 2008 and 2012 and 2013 and 2020. After the first commitment period, a 40% increase in overall GHG levels from 1990 levels was measured instead of the intended 5% decrease. The second commitment period came into force on December 31, 2020, the last day of the period. Jos G.J. Olivier, Greet Janssens-Maenhout, and Jeroen A.H.W. Peters, *Trends in global CO2 and total greenhouse gas emissions: 2012 Report* (Hague: PBL Publication, 2012), 10, <https://www.pbl.nl/en/publications/trends-in-global-co2-emissions-2012-report>; David Campbell, “After Doha: What Has Climate Change Policy Accomplished?” *Journal of Environmental Law* 25, no. 1 (2013): 126; “What is the Kyoto Protocol?” United Nations Climate Change, accessed November 11, 2021, [https://unfccc.int/kyoto\\_protocol](https://unfccc.int/kyoto_protocol).
- 14 | Paris Agreement, Art. 3-4. Conference of Parties, “Decision 1/CP.21 Adaption of the Paris Agreement,” FCCC/CP/2015/10/Add.1, January 29, 2016, 22-25.
- 15 | Paris Agreement, Art. 2(1)(a), and 4(2).
- 16 | *Ibid*, Art. 4(2)-4(3).

- 17 | Eroğlu, “Paris İklim Anlaşması Bugün.”
- 18 | Conference of the Parties serving as the meeting of the Parties to the Paris Agreement, “Nationally determined contributions under the Paris Agreement,” FCCC/PA/CMA/2021/8, September 17, 2021. Also, “Full NDC Synthesis Report: Some Progress, but Still a Big Concern,” United Nations Climate Change, September 17, 2021, accessed November 11, 2021, <https://unfccc.int/news/full-ndc-synthesis-report-some-progress-but-still-a-big-concern>. “Countries,” Climate Action Tracker, accessed November 11, 2021, <https://climateactiontracker.org/countries/>.
- 19 | Paris Agreement, Art. 2(1)(a).
- 20 | For details, IPCC, *Global Warming of 1.5°C* (IPCC, 2018), [https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15\\_Full\\_Report\\_Low\\_Res.pdf](https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_Low_Res.pdf).
- 21 | Stéphanie Chuffart, “Technology Transfer and Dissemination under the UNFCCC: Achievements and New Perspectives,” *SSRN* (May 2013): 6, [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2565891](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2565891). See also, IPCC, *Climate Change 2014*, 26 and 94.
- 22 | Conventional energy sources were carbon based. Anna-Alexandra Marhold, *Energy in International Trade Law: Concepts, Regulation and Changing Markets* (Cambridge: Cambridge University Press, 2021), 7-10.
- 23 | Nicholas Stern, *The Economics of Climate Change: The Stern Review* (Cambridge: Cambridge University Press, 2007), 19.
- 24 | Jos G.J. Olivier and Jeroen A.H.W. Peters, *Trends in global CO<sub>2</sub> and total greenhouse gas emissions: 2019 Report* (Hague: PBL Publication, 2020), 15, [https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and-total-greenhouse-gas-emissions-2019-report\\_4068.pdf](https://www.pbl.nl/sites/default/files/downloads/pbl-2020-trends-in-global-co2-and-total-greenhouse-gas-emissions-2019-report_4068.pdf). See also, “Emissions Shares,” United Nations Food and Agriculture Organization, 2020, accessed November 11, 2021, <https://www.fao.org/faostat/en/#data/EM>.
- 25 | For further information, UNFCCC Secretariat, “Technologies for Adaptation to Climate Change,” 2006, accessed November 11, 2021, [http://unfccc.int/resource/docs/publications/tech\\_for\\_adaptation\\_06.pdf](http://unfccc.int/resource/docs/publications/tech_for_adaptation_06.pdf). See also, UNFCCC, Art. 2; Paris Agreement, Art. 2(1)(b).
- 26 | UNFCCC, Art. 4(5).
- 27 | Paris Agreement, Preamble, Art. 6 and 10. COP to the Paris Agreement, “Glasgow Climate Pact,” FCCC/PA/CMA/2021/L.16, October 31–November 12, 2021, para 40–60; UNFCCC Subsidiary Body for Scientific and Technological Advice and Subsidiary Body for Implementation, “Joint annual report of the Technology Executive Committee and the Climate Technology Centre and Network for 2021,” FCCC/SB/2021/5, September 23, 2021, 7 and 25, [https://unfccc.int/sites/default/files/resource/sb2021\\_05E.pdf](https://unfccc.int/sites/default/files/resource/sb2021_05E.pdf).
- 28 | UNFCCC, Art. 4(5). Most decisions of the COP on technology include the term ESTs. For example, “Report of the Conference of the Parties on its third session, held at Kyoto from 1 to 11 December 1997,” FCCC/CP/1997/7/Add.1, March 25, 1998. For the UN entities, see all UN-related sources in this paper.
- 29 | United Nations Conference on Environment and Development, “AGENDA 21,” June 3–14, 1992, para 34.1.
- 30 | Commented by systematically looking at projects undertaken under the Global Environment Facility (<https://www.thegef.org/projects>), Green Climate Fund (<https://www.greenclimate.fund/projects>) and Technology Mechanism (<https://unfccc.int/ttclear/projects>).
- 31 | “Project Portfolio,” Green Climate Fund, accessed November 11, 2021, <https://www.greenclimate.fund/projects#overview>.
- 32 | Wei Zhuang, *Intellectual Property Rights and Climate Change: Interpreting the TRIPS Agreement for Environmentally Sound Technologies* (Cambridge: Cambridge University Press, 2017), 13–14.

- 33 | For a good demonstration, Stephen Humphreys, “Structural Ambiguity: Technology Transfer in Three Regimes,” in *Regime Interaction in International Law: Facing Fragmentation*, ed. Margaret A. Young (Cambridge: Cambridge University Press, 2012).
- 34 | United Nations Industrial Development Organization, *Module 12: Energy Efficiency Technologies and Benefits* (2009), 12.5–12.6, [https://www.unido.org/sites/default/files/2009-02/Module12\\_0.pdf](https://www.unido.org/sites/default/files/2009-02/Module12_0.pdf).
- 35 | Zhuang, *Intellectual Property Rights and Climate Change*, 14–15.
- 36 | UN Environment Programme International Environmental Technology Centre, *Phytotechnologies: A Technical Approach in Environmental Management – Freshwater Management Series No. 7*, 1<sup>st</sup> ed. (United Nations Publication, 2003), 7–9, <https://wedocs.unep.org/20.500.11822/9159>.
- 37 | Climate Change Secretariat, *Expert Group on Technology Transfer: Five Years of Work* (Bonn: UNFCCC, 2007), 12. This report emphasizes the need of a “more practical, results-oriented actions.” [https://unfccc.int/resource/docs/publications/egtt\\_eng.pdf](https://unfccc.int/resource/docs/publications/egtt_eng.pdf); Martin Khor, *Climate Change, Technology and Intellectual Property Rights: Context and Current Negotiations* (Geneva: South Centre Research Papers 45, 2012), 1, [https://www.southcentre.int/wp-content/uploads/2013/05/RP45\\_Climate-Change-Technology-and-IP\\_EN.pdf](https://www.southcentre.int/wp-content/uploads/2013/05/RP45_Climate-Change-Technology-and-IP_EN.pdf); United Nations Department of Economic and Social Affairs, *Climate Change and Technology Development and Technology Transfer* (2008), 3, [https://sustainabledevelopment.un.org/content/documents/1465back\\_paper.pdf](https://sustainabledevelopment.un.org/content/documents/1465back_paper.pdf).
- 38 | Even though the share of developing countries in the innovation and the use of ESTs is increasing, there is still a considerable difference remaining. UNEP, *Trade in Environmentally Sound Technologies: Implications for Developing Countries* (2018), 33, <https://wedocs.unep.org/handle/20.500.11822/27595>; UN Department of Economic and Social Affairs, *World Economic and Social Survey: Promoting Development, Saving the Planet* (New York: United Nations Publication, 2009), 128, [https://www.un.org/en/development/desa/policy/wess/wess\\_archive/2009wess.pdf](https://www.un.org/en/development/desa/policy/wess/wess_archive/2009wess.pdf).
- 39 | UNEP, European Patent Office and International Centre for Trade and Sustainable Development, *Patents and Clean Energy: Bridging the Gap between Evidence and Policy* (2010) 9, [http://www.eurosfair.prd.fr/7pc/doc/1308064085\\_patents\\_clean\\_energy\\_study\\_en.pdf](http://www.eurosfair.prd.fr/7pc/doc/1308064085_patents_clean_energy_study_en.pdf).
- 40 | Even though the discussions on transferring ESTs began between developed and developing countries, the author agrees with the opinions that the transfer of ESTs is needed amongst all countries regardless of their development level. For example, see the analysis for the need for developing-developing transfers in United Nations Conference on Trade and Development, *The Technology and Innovation Report 2012: Innovation, Technology and South-South Collaboration* (Geneva: United Nations Publication, 2012).
- 41 | UNFCCC, Art. 4, 11(1), and 12(4); Kyoto Protocol, Art. 2(a)(iv), 3(14), 10(b)(i), 10(c), 11(b), and 11(2)(b); Paris Agreement, Art. 6(8), 10, and 11.
- 42 | IPCC, *Methodological and Technological Issues*, 3 (emphasis added).
- 43 | For detailed analysis of orgware see, Matz L. Larsson, *The Business of Global Energy Transformation: Saving Billions Through Sustainable Models* (Hampshire and New York: Palgrave Macmillan, 2012), 16–104.
- 44 | IPCC, *Methodological and Technological Issues*, 3.
- 45 | One example for other international institutions could be the World Bank Group. “Climate Change Action Plan (2021–2025) Infographic,” The World Bank, June 22, 2021, <https://www.worldbank.org/en/news/infographic/2021/06/22/climate-change-action-plan-2021-2025>.

- 46 | UNFCCC Secretariat and UNEP DTU Partnership, *Enhancing Implementation of Technology Needs Assessments Guidance for Preparing a Technology Action Plan* (New Delhi: Magnum Custom Publishing, 2017), 2, [https://unfccc.int/ttclear/misc\\_/StaticFiles/gnwoerk\\_stat-ic/TNA\\_key\\_doc/b91e17559b3344aaae-2428d4a3608d3c/1fb8784691984dcd9b76f-7330d0c50d1.pdf](https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_stat-ic/TNA_key_doc/b91e17559b3344aaae-2428d4a3608d3c/1fb8784691984dcd9b76f-7330d0c50d1.pdf).
- 47 | Ivan Nygaard and Ulrich Elmer Hansen, “The Conceptual and Practical Challenges to Technology Categorisation in the Preparation of Technology Needs Assessments,” *Climatic Change* 131, no. 3 (2015): 371–85.
- 48 | See sources in note 37 above. Available funds and projects for the transfers will be given in the fourth paper in this series.
- 49 | Martin Cames et al., *How additional is the Clean Development Mechanism? Analysis of the application of current tools and proposed alternatives* (Berlin: Institute for Applied Ecology, 2016), 14, [https://ec.europa.eu/clima/system/files/2017-04/clean\\_dev\\_mechanism\\_en.pdf](https://ec.europa.eu/clima/system/files/2017-04/clean_dev_mechanism_en.pdf).
- 50 | IPCC, *Climate Change 2007 Mitigation: Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007), 158.
- 51 | Zhuang, *Intellectual Property Rights and Climate Change*, 22–23 explains the cycle that leads from imitation to innovation. However, once ESTs have been transferred to a host country, their sustenance has been found challenging. A study assessing 1,000 projects under the Regime claims that the vast majority of EST transfer projects do not help the host country to adapt, produce, or further develop the technology. In fact, the study identified only six projects out of 1,000 that could contribute to technical learning and sustenance of the transferred technology in the host country. See, Kasturi Das, *Technology Transfer under the Clean Development Mechanism: an empirical study of 1000 CDM projects*, (2011), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1887727](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1887727).
- 52 | The following paper identifies that point as “a critical aspect of technology transfer.” International Centre for Trade and Sustainable Development, *Climate Change, Technology Transfer and Intellectual Property Rights* (International Institute for Sustainable Development, 2008), 3 [http://www.environmentportal.in/files/2008-Aug-CC\\_trade-IPR.pdf](http://www.environmentportal.in/files/2008-Aug-CC_trade-IPR.pdf).
- 53 | Robert M. Solow, “A Contribution to the Theory of Economic Growth,” *The Quarterly Journal of Economics* 70, no. 1 (1956): 65–94; Mehdi Shafaeddin, “Towards an Alternative Perspective on Trade and Industrial Policies,” *Development and Change* 36, no. 6 (2005).
- 54 | Bernice Lee, Ilian Iliev, and Felix Preston, *Who Owns our Low-Carbon Future? Intellectual Property and Energy Technologies* (London: Chatham House, 2009). See also, UNEP, EPO, and ICTSD, *Patents and Clean Energy*.
- 55 | For full list of least developed countries, “Least Developed Countries (LDCs),” United Nations Department of Economic and Social Affairs, accessed November 11, 2021, <https://www.un.org/development/desa/dpad/least-developed-country-category.html>.
- 56 | Padmashree Gehl Sampath and Pedro Roffe, *Unpacking the International Technology Transfer Debate: Fifty Years and Beyond* (Geneva: International Centre for Trade and Sustainable Development, 2012), 7; A. K. Koul, “UNCTAD Code on Transfer of Technology: An Analysis in Legal Perspectives,” *Foreign Trade Review* XX, no. 2 (1985): 143.
- 57 | Ibid.
- 58 | Brianna Craft et al., *Least Developed Countries Paper Series: Technology Development and Transfer, the Least Developed Countries and the Future Climate Change Regime* (Climate and Development Knowledge Network, 2015), 17, <https://www.ldc-climate.org/wp-content/uploads/2017/12/tech-development-and-transfer-and-the-future-climate-regime.pdf>.

- 59 | IPCC, *Methodological and Technological Issues*, 3.
- 60 | The Global Environmental Facility, one institution of the Financial Mechanism of the UNFCCC, demonstrates that: “The GEF climate change investments have promoted technology transfer at all stages of the technology development cycle, from demonstration of innovative emerging low-carbon technologies to diffusion of commercially proven ESTs and practices.” GEF, *Transfer of Environmentally Sound Technologies: Case Studies from the GEF Climate Change Portfolio* (GEF, 2010), 6, <https://documents1.worldbank.org/curated/en/610301468160516462/pdf/656920WPOTech000Box365722BOOPUBLICO.pdf>.
- 61 | For example, “Strengthening Thailand’s institutional and technical capacities to comply with the Enhanced Transparency Framework of the Paris Agreement,” Global Environmental Facility, accessed November 11, 2021, <https://www.thegef.org/project/strengthening-thailands-institutional-and-technical-capacities-comply-enhanced-transparency>. GEF, *Behind the Numbers 2015: A Closer Look at GEF Achievements* (GEF, 2015), 1 and 6, [https://www.thegef.org/sites/default/files/publications/GEF\\_numbers2015\\_CRA\\_bl2\\_web\\_1.pdf](https://www.thegef.org/sites/default/files/publications/GEF_numbers2015_CRA_bl2_web_1.pdf).
- 62 | For further interest, UN Development Programme, *Developing Capacity Through Technical Cooperation* ed. Stephen Browne (London and Sterling: Earthscan Publications, 2002).
- 63 | “Declaration of the United Nations Conference on the Human Environment,” 1972, *International Legal Materials* vol. 11, p. 1416, Principle 20.
- 64 | For example, “UN Convention on the Law of the Sea,” adopted December 10, 1982, entered into force November 16, 1994, *United Nations Treaty Series* vol. 1833, p. 397, Art. 266; “Montreal Protocol on Substances that Deplete the Ozone Layer,” adopted September 16, 1987, entered into force January 1, 1989, *United Nations Treaty Series* vol. 1522, p. 3, Art. 5(2) and 5(3).
- 65 | UNFCCC, Art. 4(1)(c), 4(3), 4(5), 4(7), 4(8), 4(9), 11(1), 12(4). Under the UNFCCC, all parties undertook obligations for technology promotion and cooperation [Art. 4.1(c) and 4.1(g)] and the exchange of information related to technology [Art 4.1(h)]; developed countries undertook obligations to transfer ESTs and finance the costs [Art. 4(3)–4(5)]; developing countries had a conditional obligation to achieve their obligations depending on the compliance of the developed countries with their obligations related to the transfer of ESTs [Art. 4(7)]. See also, Daniel Bodansky, “The United Nations Convention on Climate Change: A Commentary,” *Yale Journal of International Law* 18 (1993): 529–530.
- 66 | COP to the UNFCCC, “Decision 26/CP.7: Amendment to the list in Annex II to the Convention,” FCCC/CP/2001/13/Add.4, January 21, 2002.
- 67 | For a good analysis see, Jutta Brunnée and Charlotte Streck, “The UNFCCC as a Negotiation Forum: Towards Common but More Differentiated Responsibilities,” *Climate Policy* 13, no. 5 (2013): 589–607; Lasse Ringius et al., “Burden Sharing and Fairness Principles in International Climate Policy,” *International Environmental Agreements: Politics, Law and Economics* 2, (2002); William I. Zartman et al., “Negotiation as a Search for Justice,” *International Negotiation* 1, no. 1 (1996).
- 68 | UNFCCC, Art. 3(1). They are modelled after the principles of the “Rio Declaration on Environment and Development,” 1992, *International Legal Materials* vol. 31, p. 874, Principles 3 and 7; Tuula Honkonen, “The principle of common but differentiated responsibility in post-2012 climate negotiations,” *Review of European Community and International Environmental Law* 18 (2009).
- 69 | Ministerial Conference on Environment and Development of Developing Countries, “Beijing Ministerial Declaration on Environment and Development,” *Chinese Journal of Population Resources and Environment* 1, no. 1 (1992). See

- also, Andrew Hurrell and Sandeep Sengupta, “Emerging Powers, North—South Relations and Global Climate Politics,” *International Affairs* 88, no. 3 (2012).
- 70 | For more discussions in this interpretation see, Kerin Mickelson, “South, North, International Environmental Law, and International Environmental Lawyers,” *Yearbook of International Environmental Law* 11, no. 1 (2000).
- 71 | See the Preamble of the UNFCCC for direct reference to this point. For the historical emission report, Marcia Rocha et al., *Historical Responsibility for Climate Change – from countries emissions to contribution to temperature increase* (Climate Analytics, 2015), [https://climateanalytics.org/media/historical\\_responsibility\\_report\\_nov\\_2015.pdf](https://climateanalytics.org/media/historical_responsibility_report_nov_2015.pdf).
- 72 | For the origins of the idea, Centre for International Sustainable Development Law, *The Principle of Common but Differentiated Responsibilities: Origins and Scope, For the World Summit on Sustainable Development* (Montreal: August 26, 2002).
- 73 | UNFCCC, Preamble recognizes this point: “Noting that the largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs.” See also, Tommi Ekholm and Tomi J. Lindroos, *Assessing Countries’ Historical Contributions to GHG Emissions* (Finnish Ministry of Environment, 2015), <https://www.vtt.fi/inf/julkaisut/muut/2015/VTT-R-00139-15.pdf>.
- 74 | UNFCCC, Art. 3(1), 4(2), 4(3), 4(4), and 4(5).
- 75 | UNFCCC, Art. 4(1)(c). Article 4(7) even notes that “[t]he extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology.”
- 76 | UNFCCC, Preamble, Art. 3(1), 4(3), 4(4), 4(5); Kyoto Protocol, Art. 11(2); Paris Agreement, Preamble, Art. 2(2), 4(4) and especially 9(1) and 9(3).
- 77 | For further interest, Bronwyn H. Hall, “The Financing of Research and Development,” *Oxford Review of Economic Policy* 18, no. 1 (2002): 35–51.
- 78 | World Bank Group, *Global Economic Prospects and the Developing Countries 2002: Making Trade Work for the World’s Poor* (Washington, DC: World Bank, 2002), 129–48, <http://documents.worldbank.org/curated/en/285571468337817024/pdf/multi0page.pdf>.
- 79 | UNFCCC Secretariat and UNDP, *Technology Needs Assessment for Climate Change* (New York: UNDP, 2010) demonstrates the cycle and potential costs involved. [https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/Technology\\_Needs\\_Assessment\\_Handbook.pdf](https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/Technology_Needs_Assessment_Handbook.pdf).
- 80 | Ibid. For human costs in general, Hasan Gürak, “Hidden Costs of Technology Transfer: Adverse Impacts of Package Deals with Restrictive Clauses,” *YK Economic Review* 2 (2003): 18–19.
- 81 | Abbe E.L. Brown, *Intellectual Property, Climate Change and Technology: Managing National Legal Intersections, Relationships and Conflicts* (Cheltenham: Edward Elgar, 2019), 38. Brown demonstrates that there is still more (taking a pluralist approach) to explore regarding national legislation on the transfer of technologies.
- 82 | The Technology Mechanism of the Regime could, however, help countries on this point.
- 83 | Das, *Technology Transfer under the Clean Development Mechanism*, demonstrates this need and issues surrounding on it.
- 84 | International Energy Agency and International Renewable Energy Agency, *Perspectives for the Energy Transition: Investment Needs for a Low-Carbon Energy System* (OECD/IEA



- and IRENA, 2017), 8, [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Mar/Perspectives\\_for\\_the\\_Energy\\_Transition\\_2017.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Mar/Perspectives_for_the_Energy_Transition_2017.pdf).
- 85 | United Nations Conference on Trade and Development, *Guidelines for the study of transfer of technology to developing countries* (New York: United Nations Publication, 1972). This document provides useful insights into the cost of transferring technologies.
- 86 | Bodansky, “The United Nations Convention on Climate Change,” 530.
- 87 | For example, training the machinists for teaching them how to drive a newer train is considered as improving local conditions for technologies. See, UNFCCC Secretariat and UNEP DTU Partnership, *Enhancing Implementation, 2*.
- 88 | The COP and other UNFCCC bodies use the IPCC’s definition on the transfer of ESTs.
- 89 | The Kyoto Protocol, Art. 2(a)(iv), 3(14), 10(b)(i), 10(c), 11(b); 11(2)(b); Paris Agreement, Art. 6(8), 10, 11. Daniel Bodansky, “The Legal Character of the Paris Agreement,” *Review of European, Comparative, and International Environmental Law* 25, no. 2 (2016), [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2735252](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2735252).
- 90 | Paris Agreement, Preamble, Art. 2(2), 4(4), 9(1), 9(3), 13(9).
- 91 | Robert Keohane and Michael Oppenheimer, “Paris: Beyond the Climate Dead End through Pledge and Review?” *Politics and Governance* 4, no. 3 (2016).
- 92 | “Countries,” Green Climate Fund, accessed November 11, 2021, <https://www.greenclimate.fund/countries>.
- 93 | “Marrakesh Agreement Establishing the World Trade Organization,” adopted April 15, 1994, entered into force January 1, 1995, *United Nations Treaty Series* vol. 1867, p. 154, Preamble, and Art. I-III, and XVI (1).
- 94 | “General Agreement on Tariffs and Trade,” adopted October 30, 1947, provisionally entered into force January 1, 1948, *United Nations Treaty Series* vol. 55, p. 187.
- 95 | For details, World Trade Organization, *Understanding the WTO*, 5<sup>th</sup> ed. (Geneva: WTO Publications, 2015), 10, [https://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/understanding\\_e.pdf](https://www.wto.org/english/thewto_e/whatis_e/tif_e/understanding_e.pdf).
- 96 | Solow, “A Contribution to the Theory.”
- 97 | UN General Assembly, “Declaration on the Establishment of a New International Economic Order,” Res 3201(S-VI), 1974, para 4(p), <https://digitallibrary.un.org/record/218450>. Also, UN General Assembly, “Programme of Action on the Establishment of a New International Economic Order,” Res 3202 (S-VI), 1974, Section IV(a) asks the formulation of an international code for transferring technologies, <https://digitallibrary.un.org/record/218451>.
- 98 | Ahmed Mahiou, “Declaration on the Establishment of a New International Economic Order,” *UN Audiovisual Library of International Law* (2011): 1, [https://legal.un.org/avl/pdf/ha/ga\\_3201/ga\\_3201\\_e.pdf](https://legal.un.org/avl/pdf/ha/ga_3201/ga_3201_e.pdf).
- 99 | “Draft International Code on the Transfer of Technology,” 1980, *International Legal Materials* vol. 19, p. 773. See also, United Nations Conference on Trade and Development Secretariat, “Draft International Code of Conduct on the Transfer of Technology as at the close of the 6<sup>th</sup> session of the Conference on 5 June 1985,” TD/CODE TOT/47, June 20, 1985.
- 100 | United Nations Conference on Trade and Development, *Virtual Institute Teaching Material on Transfer of Technology* (Geneva and New York: United Nations Publication, 2012), 89.
- 101 | Jayashree Watal and Leticia Caminero, *Least-Developed Countries, Transfer of Technology, and the TRIPS Agreement* (Geneva: WTO Economic Research and Statistic Division, February 22, 2018), 5, <https://www.econstor.eu/bitstream/10419/176766/1/1016547994.pdf>; WTO Ministerial Conference, “Implementation-Related Issues and Concerns,” WT/MIN(01)/17, November 20, 2001, para 11.2.
- 102 | “Agreement on Trade Related Aspect of Intellectual Property Rights,” adopted April 15, 1994, entered into force January 1, 1995, *United Nations Treaty Series* vol. 1869, p. 299 (TRIPS).

- 103 | Pedro Roffe, "Comment: Technology Transfer on the International Agenda," in *International Public Goods and Technology under a Globalised Intellectual Property Regime*, eds. Keith E Maskus and Jerome H Reichman (Cambridge: Cambridge University Press, 2005), 263; Watal and Caminero, *Least-Developed Countries*, 6-11; WTO Council for TRIPS, "Implementation of Article 66.2 of the TRIPS Agreement," IP/C/28, February 20, 2003, para 3.
- 104 | "Least Developed Countries (LDCs)."
- 105 | Although IPRs experts have extensively studied the issue of transfer of technologies, more input from environmental law experts is needed. See Navraj Singh Ghaleigh, "Barriers to Climate Technology Transfer: The Chimera of Intellectual Property Rights," *Carbon and Climate Law Review* 5, no. 2 (2011).
- 106 | For the negotiation phase of the draft agreement and different interest groups of states, James W. Jr. Skelton, "UNCTAD'S Draft Code of Conduct on the Transfer of Technology: A Critique," *Vanderbilt Journal of Transnational Law* 14, (1981).
- 107 | Ibid.
- 108 | Marrakesh Agreement, Preamble para 3; TRIPS, Preamble; General Agreement on Tariffs and Trade (GATT) adopted April 15, 1994, entered into force January 1, 1995, *United Nations Treaty Series* vol. 1867, p. 187, Preamble. See also, World Trade Organization, *Understanding the WTO*, 13-14.
- 109 | Peter Van den Bossche and Werner Zdouc, *The Law and Policy of the World Trade Organization: Text, Cases and Materials*, 3<sup>rd</sup> ed. (Cambridge: Cambridge University Press, 2013), 5, and for the opposing ideas see pages 13-30; Jan Klabbbers, Anne Peters, and Geir Ulfstein, *The Constitutionalization of International Law* (New York: Oxford University Press, 2009), 16: "The whole world would be better off if free trade were the norm."
- 110 | For instance, GATT 1994, Art. I; TRIPS, Art. 4.
- 111 | For instance, GATT 1994, Art. III; TRIPS, Art. 3; and "General Agreement on Trade in Services," adopted April 15, 1994, entered into force January 1, 1995, *United Nations Treaty Series* vol. 1869, p. 183, Art. 17.
- 112 | Keith E Maskus and Ruth L Okediji, *Intellectual Property Rights and International Technology Transfer to Address Climate Change: Risks, Opportunities and Policy Options* (ICTSD, 2010), 5, <https://ictsd.iisd.org/themes/climate-and-energy/research/intellectual-property-rights-and-international-technology>. Also, David Ockwell et al., "Intellectual property rights and low carbon technology transfer: Conflicting discourses of diffusion and development," *Global Environmental Change* 20, no. 4 (2010): 732.
- 113 | World Health Organization, World Intellectual Property Organization and WTO, *Promoting Access to Medical Technologies and Innovation - Intersections between Public Health, Intellectual Property and Trade* 2<sup>nd</sup> ed. (2020), 21: "Trade stimulates competition, which in turn reduces prices and offers a wider range of suppliers, improving security and predictability of supply." [https://www.wto.org/english/res\\_e/booksp\\_e/who-wipo-wto-2020\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/who-wipo-wto-2020_e.pdf).
- 114 | IPCC, *Global Warming of 1.5°C*, 12.
- 115 | Karen N Scott, "International Environmental Governance: Managing Fragmentation Through Institutional Connection," *Melbourne Journal of International Law* 12, no. 1 (2011): 8.
- 116 | James Harrison, *Making the Law of the Sea: A Study in the Development of International Law* (Cambridge: Cambridge University Press, 2011), 238.
- 117 | Sebastian Oberthür, "Interplay Management: Enhancing Environmental Policy Integration among International Institutions," *International Environmental Agreements: Politics, Law and Economics* 9, no. 4, (2009): 372. Also, Duncan Brack, "Environmental Treaties and Trade: Multilateral Environmental Agreements and the Multilateral Trading System," in *Trade, environment, and the Millennium*, eds. Gary P

- Sampson and Bradnee W. Chambers (Tokyo and New York: UN University Press, 2002).
- 118 | “What is the Harmonized System (HS)?” World Customs Organization, accessed November 11, 2021, <http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx>. See also, Dayong Yu, *The Harmonized System – Amendments and their Impact in WTO Members’ Schedules* (Geneva: WTO, 2008).
- 119 | “What is the Harmonized System (HS)?”
- 120 | “Harmonised System,” World Customs Organization, accessed November 11, 2021, <https://www.wcotradetools.org/en/harmonized-system>.
- 121 | Izaak Wind, *HS Codes and the Renewable Energy Sector* (International Centre for Trade and Sustainable Development, 2010), 7–8, <https://ictsd.iisd.org/themes/environment/research/hs-codes-and-the-renewable-energy-sector>. Also, Eurostat, *The environmental goods and services sector* (Office for Official Publications of the European Communities, 2009), 102–6, <https://ec.europa.eu/eurostat/documents/3859598/5910217/KS-RA-09-012-EN.PDF/01d1733e-46b6-4da8-92e6-766a65d7fd60?version=1.0>.
- 122 | Policy measures are “typically distinguished as either regulatory measures (i.e., regulations and standards) or economic incentives (e.g., taxes, tradable permits, and subsidies).” Ludivine Tamiotti et al., *Trade and Climate Change: A Report by the United Nations Environment Programme and the World Trade Organization* (2009), 88, [https://www.wto.org/english/res\\_e/booksp\\_e/trade\\_climate\\_change\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/trade_climate_change_e.pdf).
- 123 | In 2017, for example, fossil fuels were generally much cheaper than renewables. International Energy Agency, *World Energy Outlook 2017* (IEA, 2017), <https://www.iea.org/reports/world-energy-outlook-2017>. For recent changes see, “World Energy Outlook 2021: Report extract, Overview,” IEA, accessed November 11, 2021, <https://www.iea.org/reports/world-energy-outlook-2021/overview>.
- 124 | For details see, International Energy Agency, *World Energy Outlook 2021* (IEA, 2021), <https://www.iea.org/reports/world-energy-outlook-2021>. For an example, Michael Safi, “Indian Solar Power Prices Hit Record Low Undercutting Fossil-Fuels,” *The Guardian*, May 10, 2017, accessed November 11, 2021, <https://www.theguardian.com/environment/2017/may/10/indian-solar-power-prices-hit-record-low-undercutting-fossil-fuels>.
- 125 | “Understanding on Rules and Procedures Governing the Settlement of Disputes,” adopted April 15, 1994, entered into force January 1, 1995, *United Nations Treaty Series* vol. 1869, p. 401.
- 126 | *India – Certain Measures Relating to Solar Cells and Solar Modules*, Report of the Appellate Body-WT/DS456/AB/R (September 16, 2016).
- 127 | Vyoma Jha, “Sunny Skies Ahead? Political Economy of Climate, Trade and Solar Energy in India,” *Trade, Law & Development* 9, no. 2, (2017): 178.
- 128 | Humphreys, “Structural Ambiguity,” 187: “*de facto* superiority attaches to those regimes boasting strong judicial organs.”
- 129 | For further details, Steve Gary Clyde Hufbauer, Steve Charnovitz, and Jisun Kim, *Global Warming and the World Trading System* (Washington, DC: Peterson Institute for International Economics, 2009).
- 130 | Jha, “Sunny Skies Ahead?” 186, notes: “Not every country designs every policy thinking of WTO implications. You often take a call that you want to have a policy for whatever other reasons you may have. And indeed, when it gets challenged, you tackle it as and when it comes. WTO rulings are prospective in nature and you can try to achieve what you can at the time the dispute plays out.” (footnote omitted).

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The Istanbul Policy Center-Sabancı University-Stiftung Mercator Initiative aims to strengthen the academic, political, and social ties between Turkey and Germany as well as Turkey and Europe. The Initiative is based on the premise that the acquisition of knowledge and the exchange of people and ideas are preconditions for meeting the challenges of an increasingly globalized world in the 21<sup>st</sup> century. The Initiative focuses on two areas of cooperation, EU/German-Turkish relations and climate change, which are of essential importance for the future of Turkey and Germany within a larger European and global context.

The interpretations and conclusions made in this analysis belong solely to the author and do not reflect IPC's official position

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