



## **International Dimensions of Climate Change**

### **Report 4: A reflection on the long-term evolution of international climate change law and potential impacts upon key areas that may require a response from the United Kingdom**

Javier de Cendra de Larragán, University College, London

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## Contents

1. Introduction and limitations .....	5
2. Methodology and assumptions .....	5
3. Structure.....	7
4. Interactions between international, EU, and domestic law.....	7
5. An overview of scenarios on future emissions .....	9
5.1. Emission scenarios and mitigation pathways in the IPPC 4 <sup>th</sup> AR.....	9
5.2. Impacts associated with different emission scenarios .....	11
5.3. Some significant developments post-4 AR .....	12
6. An overview of global environmental assessments and global governance scenarios.....	13
6.1. Global environmental assessments .....	13
6.2. Key shifts in global governance up to 2030 .....	14
7. Underlying trends in international law .....	18
7.1. Underlying trends in the international law literature .....	18
7.2. Underlying trends in the international climate change legal literature.....	19
7.3. Trends in the international climate change negotiations .....	22
8. Pulling the threads together: developing future scenarios to think about the evolution of international climate change law.....	31
8.1. Coordinated mitigation: an international climate change organization under the UNFCCC .....	31
8.2. Coordinated mitigation outside the UN .....	33
8.3. Autonomous mitigation.....	34
Climate change liability .....	36
Geoengineering.....	37
8.4. Coordinated adaptation.....	39
8.5. Autonomous adaptation .....	40
9. Impacts in key areas of legal developments within each of the scenarios.....	41
9.1. Impacts related to the coordinated mitigation scenario .....	42
9.2. Impacts related to the coordinated mitigation outside the UN scenario .....	44
9.3. Impacts related to the autonomous mitigation scenario .....	44
9.4. Impacts related to the coordinated adaptation scenario .....	46
9.5. Impacts related to the autonomous adaptation scenario .....	47
10. Final remarks on the relevance of the foregoing scenarios on the development of international climate change law for the United Kingdom's adaptation response .....	48
11. Conclusion and recommendations.....	52
Bibliography .....	54

## **Executive summary**

This preliminary report undertakes a “state of science” review of the evolution of international climate change law in the next twenty years, in order to identify the potential impacts it might generate upon a number of key areas (people, health, physical resources and commodities, global governance, overseas infrastructure, national security, global positioning and competitive advantage of firms, knowledge, technology and skills, financial services and insurance, and social/ethics), with the purpose of facilitating the consideration of possible responses by the UK government. By considering a number of scenarios on the possible development of international climate change law, it aims at identifying key impacts on certain areas that might require a response from the UK.

Given the limited resources, this report does not assess in detail the nature and intensity of the impacts or the possible responses. Neither does it consider in detail the impact that future developments of international climate change law might have upon other areas of international law such as trade law, the law of the sea, space law and humanitarian/refugee law. Nevertheless, these are certainly relevant issues and should therefore be subject to further research.

Against the background of underlying trends in international politics and international law, we analyze the relevant literature to ascertain underlying trends within international climate change law and politics. Two such (broad) trends can be discerned: first, the international negotiations undertaken under the UNFCCC are progressing towards a multi-track framework in which different countries or groups of countries assume different types of commitments or actions along different tracks; second, and possibly as a consequence of the problems running deep within the UNFCCC framework (large number of countries involved, widely different levels of responsibility and capacity, polarization between developed and developing countries, and problems with existing rules for the adoption of decisions), climate change

governance is proceeding under multiple forums, covering multilateral groups, action-oriented partnerships, bilateral agreements, and initiatives of development banks and NGOs. This complex and fragmented picture is placed in this report against rapidly rising global emissions. This suggests that the future evolution of international climate change law might depend not only on the underlying problems identified above, but also on the evolution of global emissions and associated climate impacts. To reflect on this insight, five scenarios on how international climate change law could evolve and associated climatic consequences are considered, reflecting different levels of coordination and effectiveness: (1) coordinated mitigation under the UNFCCC; (2) coordinated mitigation largely outside the UN; (3) autonomous mitigation; (4) coordinated adaptation; (5) autonomous adaptation. Potential impacts in key areas arising within each of these scenarios are identified. A matrix linking the scenarios with these areas in order to estimate the intensity of the impacts is then developed. Each scenario presents different challenges, and therefore will require different strategies to tackle them. Nevertheless, some issues arise under most scenarios, including the further development of a global carbon market and the possible rise in importance of some geoengineering techniques. Particularly the latter may present unique challenges to certain areas of international law, and deserves further exploration. The overall recommendation is that the UK should develop an adaptation response that is robust to the impacts generated under all or most scenarios. Specific responses that would satisfy this criteria are: increasing renewable sources of energy in the domestic energy mix, integrate the UK energy system more fully into the EU system (and probably in a pan-European system), promoting intensively energy efficiency, CCS and nuclear energy at international and domestic levels, building and maintaining a leading position in the global carbon market, putting strong efforts in understanding the needs and interests of large developing countries, increasing trade and political relations with China, India and other emerging powers, adapting infrastructure to increasing climate change impacts, and last but not least, consider climate change as a national security issue and consider military related implications should the worst scenarios materialize. Further research is clearly needed to determine whether and how these

strategies can be combined within an overarching strategy. In doing so, the historical influence of the UK in the development of international law, possibly increased through the EU, should be kept in mind. At the end of the day, which of the scenarios represents better the reality will depend on choices, including ethical ones, made in the next few years.

## **1. Introduction and limitations**

The main goal of this report is to undertake a “state of science” review<sup>1</sup> of the evolution of international climate change law in the next ten to twenty years, in order to identify the potential impacts it might create upon a number of key areas, with the purpose of facilitating the consideration of possible responses by the UK government. Given the limited resources associated with this review, the aim will neither be to develop full scenarios of the future, nor to conduct a thorough analysis of potential impacts on all these areas, but rather to highlight those which are considered to be the most important (or less understood) ones. The key impacts generated by developments in international climate change law will require associated (legal) responses from the UK. This report will however not attempt at assessing in detail the nature and form of those responses. This should rather be left to a follow-up report. In addition, this report will not assess in detail how other areas of international law, e.g. trade law, the law of the sea, space law and humanitarian/refugee law, might evolve to cope with advances in international climate change law and with the impacts of climate change itself. However this report recognizes that this is an important task in itself and should also be subject to further research.

## **2. Methodology and assumptions**

In order to guide thinking about the evolution of international climate change law, this state of science review will be guided by scenarios developed within

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<sup>1</sup> The foresight website defines a State of science reviews as a tool to ‘explore specific areas in advance of futures work. They are written by experts in each field and address developments that inform the chosen futures topic. The reviews can be brief and used as an aid to select areas of investigation’.

other scientific disciplines, and will use them to reflect upon plausible legal developments that could be in line with those scenarios. Scenarios are plausible representations of the future based on sets of internally consistent assumptions about key relationships in a system, processes of change or desired end-states. The approach may be normative or exploratory. Exploratory approaches, which are the relevant ones in this report, take past trends as their starting point. They have been dominant in the global change assessments over the last decade, including the IPCC and the Millenium Ecosystem Assessment. Needless to say, no probabilities are attached to each of these pathways, and it is of course possible that the future will reflect elements captured in all of the pathways. This report will not develop its own scenarios; rather will learn from scenarios developed by other studies in order to infer the legal developments that would likely dominate in each of them. It can therefore be described as an expert guess approach to the legal dimension of existing scenarios prepared in different contexts and through non-legal methodologies.

Once possible legislative developments are derived from the scenarios, this report will consider their potential effects upon a number of key areas highlighted in the project proposal, and which include people, health, physical resources and commodities, global governance and institutions, overseas infrastructure, national security, global positioning and competitive advantage of firms, knowledge, technology and skills, financial services and insurance, social and ethics. Clearly, some scenarios will be more relevant for some areas than for others. Given the amount of key areas, and the limited resources available, this report will only focus on those that appear to be most affected by the different scenarios.

This methodology will be completed by interviews with key experts within governments and academia.

International legal developments are taken in this study to constitute to a large extent an independent variable that affects the UK (and which the UK can only to a very limited extent influence). In order to understand how international law affects the development of legal responses by the UK, a brief

overview will be given to the interaction between international law and English law.

### **3. Structure**

The report is structured as follows:

Section 4 will provide some legal background by discussing the main interactions between international law, EU law, and domestic law. Section 5 will discuss the core findings of emissions scenarios developed by the IPCC in its Fourth Assessment Report, as well as some subsequent developments, in order to ascertain the nature and extent of the challenges that climate change law will have to confront in the next years. Section 6 will look in more detail to global scenarios, including scenarios on global governance, in order to ascertain global trends that may affect the evolution of international climate change law. Section 7 examines the evolution of international climate change law, in order to allow making educated guesses as to the main lines of its evolution. Section 8 will draw upon the foregoing findings in order to set forth five scenarios that reflect possible pathways for the future of international climate change law. Section 9 will consider the main impacts that legal developments under those scenarios could have in the key areas of concern. Section 10 will highlight possible elements of the UK response to developments in international climate change law. Section 11 will conclude by providing a number of recommendations.

### **4. Interactions between international, EU, and domestic law**

The interactions between international law, EU law and domestic law are briefly as follows:

- The UK is a dualist state in its relationship with international law, i.e. international treaties are only part of domestic law if an enabling Act of Parliament has been passed. Rules of customary law international law

are part of domestic law unless they are inconsistent with Acts of Parliament or prior judicial decisions of final authority.

- Domestic law has historically strongly influenced the law of many foreign countries through the Commonwealth.
- EU law enjoys supremacy over UK law. Under EU law, when the EU concludes an international environmental agreement, it normally does so together with its member states, in what are known as mixed agreements. Although the precise distribution of competences between the EU and the states in relation to mixed agreements is not always an obvious and/or uncontentious issue<sup>2</sup>, both the EC institutions and the member states must do their utmost to ensure compliance with them.<sup>3</sup>
- The impact of EU law upon international and domestic law is constantly growing, particularly in the area of climate change ((Jordan, Huitema et al. 2010), in what is known as the ‘Europeanization’ of international law ((Wouters, Nollkaemper et al. 2008). This means, i.e., that EU law largely determines how international (climate change) law is to be applied in the EU member states ((Wahl 2008). Since the bulk of EU environmental law is adopted through qualified majority voting in the Council (though with some important exceptions in the area of energy policy, taxation and land planning, which however look increasingly weak in the context of climate change policy with its horizontal nature), it can become binding upon the UK regardless of its position in the Council.
- Given the horizontal nature of climate change policy, even areas for which unanimity is required in the Council are not ‘safe’ from impacts of EU law.

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<sup>2</sup> See ECJ Opinion 2/00, [2001] ECR I-9713.

<sup>3</sup> *Hauptzollamt Mainz v. C.A. Kupferberg & Cie KG a.A.*, Case 104/81, [1982] ECR 3641, at para.11. See, in the context of the Kyoto Protocol and the EU, Larragán, J. d. C. d. (2010). "United we stand, divided we fall: The potential role of the principle of loyal cooperation in ensuring compliance of the European Community with the Kyoto Protocol." *Climate Law* 1(1): 159-176.

## **5. An overview of scenarios on future emissions**

### **5.1. Emission scenarios and mitigation pathways in the IPCC 4<sup>th</sup> AR**

The relevance of scientific findings in the evolution of (international) environmental law is well documented. In the context of climate change, the reports of the IPCC have had an increasing importance in the tone and content of the negotiations that states carry within the auspices of the United Nations. The IPCC has developed 'reference' scenarios of future emissions that assume no policy interventions to reduce emissions, in order to determine the magnitude of additional emissions reductions needed to stabilize atmospheric carbon-dioxide concentrations at various levels. It has also developed stabilization scenarios in order to estimate the depth and pace of mitigation that is needed to achieve different stabilization levels. It is on these 'additional' reductions and stabilization scenarios that policy-makers have focused most attention. Table 1 describes those scenarios, which describe future possible worlds, and which the IPCC considers equally sound. Table 2 shows alternative stabilization scenarios.

## Table 1. Emission scenarios from the IPCC Special Report on Emission Scenarios

### Box SPM.1: The emission scenarios of the IPCC Special Report on Emission Scenarios (SRES)

A1. The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non fossil energy sources (A1T), or a balance across all sources (A1B) (where balanced is defined as not relying too heavily on one particular energy source, on the assumption that similar improvement rates apply to all energy supply and end use technologies).

A2. The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing population. Economic development is primarily regionally oriented and per capita economic growth and technological change more fragmented and slower than other storylines.

B1. The B1 storyline and scenario family describes a convergent world with the same global population, that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid change in economic structures toward a service and information economy, with reductions in material intensity and the introduction of clean and resource efficient technologies. The emphasis is on global solutions to economic, social and environmental sustainability, including improved equity, but without additional climate initiatives.

B2. The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social and environmental sustainability. It is a world with continuously increasing global population, at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented towards environmental protection and social equity, it focuses on local and regional levels.

An illustrative scenario was chosen for each of the six scenario groups A1B, A1FI, A1T, A2, B1 and B2. All should be considered equally sound.

The SRES scenarios do not include additional climate initiatives, which means that no scenarios are included that explicitly assume implementation of the United Nations Framework Convention on Climate Change or the emissions targets of the Kyoto Protocol.

*This box summarizing the SRES scenarios is taken from the Third Assessment Report and has been subject to prior line by line approval by the Panel.*

## Table 2. Post-TAR Stabilization scenarios

Table SPM.5: Characteristics of post-TAR stabilization scenarios [Table TS 2, 3.10]<sup>a)</sup>

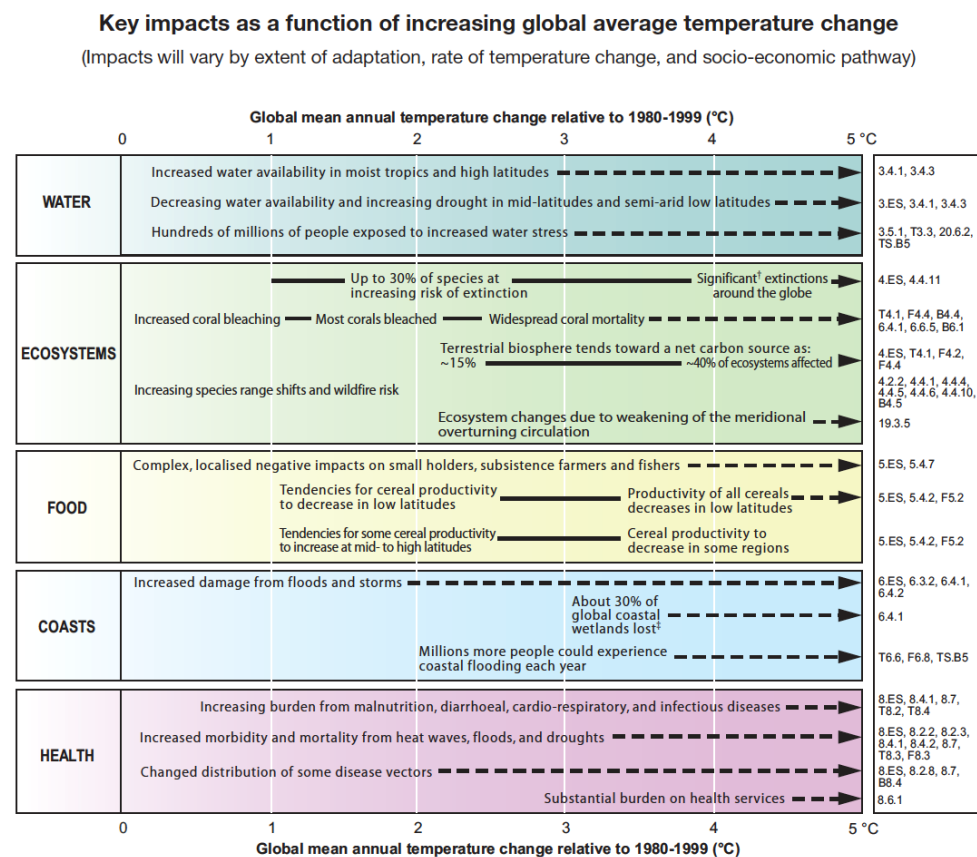
Category	Radiative forcing (W/m <sup>2</sup> )	CO <sub>2</sub> concentration <sup>c)</sup> (ppm)	CO <sub>2</sub> -eq concentration <sup>c)</sup> (ppm)	Global mean temperature increase above pre-industrial at equilibrium, using "best estimate" climate sensitivity <sup>b), c)</sup> (°C)	Peaking year for CO <sub>2</sub> emissions <sup>d)</sup>	Change in global CO <sub>2</sub> emissions in 2050 (% of 2000 emissions) <sup>d)</sup>	No. of assessed scenarios
I	2.5-3.0	350-400	445-490	2.0-2.4	2000-2015	-85 to -50	6
II	3.0-3.5	400-440	490-535	2.4-2.8	2000-2020	-60 to -30	18
III	3.5-4.0	440-485	535-590	2.8-3.2	2010-2030	-30 to +5	21
IV	4.0-5.0	485-570	590-710	3.2-4.0	2020-2060	+10 to +60	118
V	5.0-6.0	570-660	710-855	4.0-4.9	2050-2080	+25 to +85	9
VI	6.0-7.5	660-790	855-1130	4.9-6.1	2060-2090	+90 to +140	5
Total							177

- a) The understanding of the climate system response to radiative forcing as well as feedbacks is assessed in detail in the AR4 WGI Report. Feedbacks between the carbon cycle and climate change affect the required mitigation for a particular stabilization level of atmospheric carbon dioxide concentration. These feedbacks are expected to increase the fraction of anthropogenic emissions that remains in the atmosphere as the climate system warms. Therefore, the emission reductions to meet a particular stabilization level reported in the mitigation studies assessed here might be underestimated.
- b) The best estimate of climate sensitivity is 3°C [WG 1 SPM].
- c) Note that global mean temperature at equilibrium is different from expected global mean temperature at the time of stabilization of GHG concentrations due to the inertia of the climate system. For the majority of scenarios assessed, stabilisation of GHG concentrations occurs between 2100 and 2150.
- d) Ranges correspond to the 15<sup>th</sup> to 85<sup>th</sup> percentile of the post-TAR scenario distribution. CO<sub>2</sub> emissions are shown so multi-gas scenarios can be compared with CO<sub>2</sub>-only scenarios.

## 5.2. Impacts associated with different emission scenarios

The IPCC has worked out the impacts of climate change during the 21<sup>st</sup> century for each system, sector and region associated with the different scenarios mentioned above. The magnitude of the impacts will vary with the amount and timing of climate change and, in some cases, the capacity to adapt. The worst affected regions will be the Arctic, Africa—in particular the sub-Saharan region due to their low adapting capacity—small islands due to high exposure to risk of sea-level rise and increased storm-surges, and Asian mega-deltas, due to large populations and high exposure to sea-level rise, storm surge and river flooding. In general, the higher the concentration levels, the higher and more widespread the impacts (IPCC, 2007, 50 et seq.).

**Table 3. Key impacts as a function of increasing global average temperature change**



<sup>†</sup> Significant is defined here as more than 40%.

<sup>‡</sup> Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.

**Figure SPM.2.** Illustrative examples of global impacts projected for climate changes (and sea level and atmospheric carbon dioxide where relevant) associated with different amounts of increase in global average surface temperature in the 21st century [T20.8]. The black lines link impacts, dotted arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left-hand side of the text indicates the approximate onset of a given impact. Quantitative entries for water stress and flooding represent the additional impacts of climate change relative to the conditions projected across the range of Special Report on Emissions Scenarios (SRES) scenarios A1FI, A2, B1 and B2 (see Endbox 3). Adaptation to climate change is not included in these estimations. All entries are from published studies recorded in the chapters of the Assessment. Sources are given in the right-hand column of the Table. Confidence levels for all statements are high.

### 5.3. Some significant developments post-4 AR

Relevant developments which have taken place after the release of the 4 AR of the IPCC include:

- Revisions to stabilization scenarios that suggest that substantially lower stabilization levels are required to avoid dangerous climate change ((Hansen, Sato et al. 2008).
- Increasing doubts about the assumptions employed by the IPCC on the rate of 'spontaneous decarbonization', which are considered by some as unrealistic at best and dangerous at worst ((Pielke, Wigley et al. 2008).

- Doubts among the public at large about the credibility of climate change science (Tollefson 2010).
- Doubts about the usefulness for policymaking processes of low carbon and energy scenarios (Hughes et al, 2009).

All these developments combine to make the challenge of avoiding climate change even more daunting and at the same time more complex, and therefore lend credibility to the necessity of examining extreme scenarios about the level of climate change than can occur in the mid and long-term future.

## **6. An overview of global environmental assessments and global governance scenarios**

### **6.1. Global environmental assessments**

Climate change is just one of the challenges which the international community will have to confront in the 21<sup>st</sup> century. In the last few years, a large number of global environmental assessments have been produced to assess other challenges for sustainable development.<sup>4</sup> Those studies unanimously agree that the main global challenges that are not being sufficiently addressed include extreme hunger and poverty, which will not be halved by 2015 in all countries (UN Millennium Development Goals), the rate at which biodiversity is being lost, which will not be reduced by 2010 (a goal set in the Convention on Biological Diversity, the CBD) and the impacts of climate change, which will not remain within safe limits (the goal of the United Nations Framework Convention on Climate Change, the UNFCCC). However, it must be noted that the IPCC's Fourth Assessment Report states that mitigation and adaptation can complement each other and, whereas they

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<sup>4</sup> These include: *Global Environment Outlook 4: Environment for Development*, published by the United Nations Environment Programme (UNEP, 2007); *Climate Change 2007. Fourth Assessment Report*, published by the Intergovernmental Panel on Climate Change; *The Environmental Outlook to 2030*, published by the OECD (OECD, 2008), and the *International Assessment of Agricultural Science and Technology for Development (IAASTD)*, which is supported by amongst others the UN's Food and Agriculture Organisation (FAO), the UN Development Programme (UNDP), the UN Environment Programme (UNEP) and the World Bank (IAASTD, 2008).

cannot avoid all climate impacts, together can significantly reduce the risks of climate change. Indeed, many impacts can be reduced, delayed or avoided by mitigation, if it takes place swiftly during the next two or three decades. Adaptation will be necessary in the short and long term to address impacts resulting from the warming that would occur even for the lowest stabilization scenarios assessed by the IPCC.

An important unanimous conclusion of these assessments is that rapid action is needed on all these fronts, and that it will have to come from global coalitions. However, none of these assessments provide any insights on how such coalitions should be developed and how they could look like (Kok et al. 2008). The likelihood and possible shape of such global coalitions will be investigated in the next section by looking at key shifts in global governance up to 2030. Doing this will also allow exploring the political environment in which international climate change law will develop.

## **6.2. Key shifts in global governance up to 2030**

In order to think about the future evolution of international climate change law, it is necessary to place it within a wider context by considering the possible evolution of global governance in the next twenty years. Within that literature, scenarios are used to provide a description of the factors likely to shape events, rather than predictions of what will actually happen, and therefore offer guidance to policy makers.

From a review of the relevant literature, we find some agreement on the fact that that the international system as constructed following the second world war will be almost unrecognizable by 2025 owing to the rise of emerging powers, a globalizing economy, an historic transfer of relative wealth and economic power from West to East, and the growing influence of non-state actors (Several 2008).

- The current transfer of global wealth and economic power from West to East is without precedent in modern history. The shift comes from two sources: first, the continued economic growth in Brazil, Russia, India

and China (the BRIC countries), which suggests that they will match the original share of G-7's share of global GDP by 2040-2050. In particular, China will have more impact on the world over the next 20 years than any other country, and if current trends persist, it will have the world's second largest economy by 2025 and will be a leading military power, the largest importer of natural resources and the biggest polluter. India will also enjoy rapid economic growth and will strive for a multipolar world in which it is one of the poles. Hence, the relations between China and India are crucial in determining the future global order. Second, Europe will lose power in relative terms although it will remain much richer in per capita terms than BRIC countries.

- The transnational agenda will be strongly dominated by resource issues. Unprecedented global economic growth will continue to put pressure on a number of highly strategic resources, including energy, food, and water, and demand is projected to outstrip easily available supplies over the next decade or so. First, the world will be in the midst of a fundamental energy transition away from oil toward natural gas, coal and other alternatives, which is independent from climate change considerations (although the latter considerations make it even more urgent (International Energy Agency 2008) and will have profound and lasting consequences for countries whose economies are heavily reliant on oil and gas exports. The National Intelligence Council notes that, while new technologies might be able to provide solutions, the fact is that all current technologies are inadequate for replacing the traditional energy architecture on the scale needed, and new energy technologies probably will not be commercially viable and widespread by 2025. Even with a favorable policy and funding environment for biofuels, clean coal, or hydrogen, the transition to new fuels will be slow, although technological breakthroughs remain possible (National Security Council, 2008). The IPCC Fourth Assessment Report has taken a more positive approach to this issue by noting that "there is high agreement and much evidence that all stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in

coming decades, assuming appropriate and effective incentives are in place [...] (IPCC 2007, 68). The IEA has developed scenarios on how mixes of existing and future energy technologies, including energy efficiency technologies, could lead to the level of mitigation needed to avoid dangerous climate change (IEA, 2008)

- Second, demand for food will rise by 50 percent by 2030, as a result of growing world population, rising affluence, and the shift to Western dietary preferences by a larger middle class (NSC 2008). Third, lack of access to stable supplies of water will reach critical proportions, particularly for agricultural purposes, with more and more states facing food and water shortages by 2025. Climate change is expected to exacerbate resource scarcities. Although the impact of climate change will vary by region, a number of regions will begin to suffer harmful effects, particularly water scarcity and loss of agricultural production. Poor countries will be worst affected.
- Terrorism, nuclear proliferation and conflict will remain key issues even as resource issues move up on the international agenda. Nevertheless, ideological conflicts akin to those that existed during the cold war are unlikely.
- In all likelihood, the trend toward greater diffusion of authority and power that has been occurring for a couple decades is likely to accelerate because of the emergence of new global players, the worsening institutional deficit, potential expansion of regional blocs, and enhanced strength of non-state actors and networks. The multiplicity of actors on the international scene could add strength—in terms of filling gaps left by aging post-World War II institutions—or further fragment the international system and incapacitate international cooperation. The diversity in the type of actors raises the likelihood of fragmentation occurring over the next two decades, particularly given the wide array of transnational challenges facing the international community. In particular, the BRIC countries will have some degree of freedom to follow their own agendas rather than fully adopting Western norms. They are also likely to want to preserve their policy freedom to

maneuver, allowing others to carry the primary burden for dealing with such issues as terrorism, climate change, proliferation, and energy security. Existing multilateral institutions—which are large and cumbersome and were designed for a different geopolitical order—will have difficulty adapting quickly to undertake new missions, accommodate changing memberships, and augment their resources.

All these trends among others such as demographic transitions will have important consequences for the evolution of the global world order, and certainly for the evolution of the international climate change regime (and by implication for the EU and UK climate change regimes).

There have been some efforts in the literature to consider in particular the possible impacts of different scenarios on the evolution of climate change for global governance from the perspective of foreign policy and national security. Campbell et al. have developed three scenarios of climate change impacts in the next thirty years in order to reflect on potential implications (Campbell 2010). These scenarios (which are different than the scenarios considered by the IPCC), include different levels of impacts of climate change, from expected to severe to catastrophic. The realization of the first scenario is seen by the authors as unavoidable, and will force the international community to undertake deep changes in governance to deal with the ensuing challenges. This could include, for instance, the establishment of a Climate Change Security Council. It should be noted that the idea of a Climate Change Security Council has been advanced by some legal authors, but there is no agreement about its feasibility, particularly given the extremely slow progress in reforming permanent membership of the UN Security Council (UNSC) and the suspicions aroused by the UK when it suggested introducing climate change as a security issue in the UNSC agenda (Sindico 2007). Another issue would be the need to deal with potentially very large flows of climate refugees, which will need to be recognized in some way under international law (Podesta and Ogden 2008). The realization of the latter scenario, to which the authors attach a reasonable likelihood, would mean that humankind will enter into an 'Age of Survival' (Burke 2008). States will turn inwards and

there will be a massive economic recession, bringing living standards back to those of the early 20<sup>th</sup> century, systematic state failures, wars, and massive deaths.

## **7. Underlying trends in international law**

### **7.1. Underlying trends in the international law**

#### **literature**

There have been efforts to reflect on how international law could and should evolve in the near future. Most of this literature starts by making a number of fundamental observations on how relations among states are changing, and trying to reflect on what they might mean for the still dominant Westphalian approach to international law (Falk 2008). Among the most important changes that sign a transition away from a Westphalian order towards a new order, which is not yet completely understood, are the two world wars, the dynamics of decolonization, and the various globalizing tendencies that are increasingly encouraging regional and global institutional arrangements for managing complexity and various forms of fragility, especially environmental and economic. Globalizing trends and their impacts on understandings of international law have received particular attention by international lawyers. Some have reacted by reformulating theories of international law that challenge prevailing realist assumptions (Slaughter 1995); others have argued that growing networks of international institutions are giving way to a nascent global state (Chimni 2004); yet others have focused on particular emerging patterns of global governance that come from western countries, that could be described as global administrative law (Kingsbury, Krisch et al. 2005), and that would focus, from a normative perspective, on principles of administrative law that foster democracy at global level. Last but not least, some focus on the challenges that have to be overcome for international law to make a reality its ideals of world peace and human welfare, at a point in time where this seems to be more than mere utopia (Allot 1999). The latter in particular point out that trends should not be interpreted in deterministic fashion, and how international law will evolve in the future depends on (moral) choices made

now. Indeed, moral and ethical choices made by representatives of states will impact the evolution of international climate change law, to which we now turn.

## **7.2. Underlying trends in the international climate change legal literature**

The current climate change regime has progressively evolved over the last 20 years, and there is a large legal and economic literature trying to assess the current regime from a functional perspective, in order to identify its strengths and weaknesses.

There is broad agreement within the economic literature that, since climate change is a global problem, a global (or at least multilateral) solution is required in order to prevent free riding and enabling meaningful action. Moreover, given the relatively high costs of substantial mitigation, economic instruments should be a crucial part of the regulatory landscape (Stern 2007). From these basic points, economists go on to examine the main strengths and weaknesses of the present regime. (Olmstead and Stavins 2010). Among the former, they point to the adoption of market based instruments for mitigation, the flexibility afforded to developed country parties to comply with their mitigation targets in any way they want, and the appearance of fairness in that the regime imposes mitigation targets only upon the wealthiest countries and those most responsible for past emissions. Among the main weaknesses identified are that some of the world's leading emitters are not constrained (namely China and India), only a relatively small number of countries is required to take action, which might lead to emissions leakage and to locking developing countries into high-carbon development paths, international emissions trading takes place among governments, which are not cost-minimizing entities, the problem of additionality within the CDM, and the short-term approach of the Kyoto Protocol, with its five years commitment periods, which is not in line with the long-term nature of climate change. (Olmstead and Stavins 2010).

From this assessment, many economists have made proposals for a future architecture of a climate change regime taking into account the realities of global politics. The main recommendations include: (i) means to ensure that the most important industrialized and developing nations are involved in meaningful ways; (ii) an extended time path of action, and; (iii) the inclusion of flexibility offered by market-based policy instruments. There is a large amount of literature adding flesh to these basic elements that does not need to be assessed here.<sup>5</sup>

One (large) strand of the legal literature has focused precisely on the challenges impeding the negotiation of a comprehensive multilateral agreement on climate change, which from the perspective of lawyers is often seen as the ideal solution. From this starting point, legal and political scientists have assessed the current climate change regime and attempted to propose improvements (Depledge and Yamin 2009).

Among the achievements of the current regime, Depledge and Yamin identify the generation of momentum, the achievement of reciprocal deals, learning, and the setting up of reporting and review obligations for developed countries. Among the weaknesses, they point to dysfunctional north-south politics, the complexity of the regime, unwieldy decision-making processes, and slow learning due to the absence of an independent technical body that could respond quickly to requests for analysis, or provide policy advice in a direct fashion.

The suggestions for reform include amending the Kyoto Protocol annex structure so that more countries can adopt absolute emission reduction targets, improving emissions data collection in developing countries, create smaller decision-making groups with clearly circumscribed governance powers, establishing a new, independent technical body to provide analysis and advice in response to specific party requests, and perhaps moving towards majority voting in some areas through 'smart voting'. Depledge and

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<sup>5</sup> A large amount of literature can be consulted in the website of the Harvard Project on International Climate Agreements.  
[http://belfercenter.ksg.harvard.edu/project/56/harvard\\_project\\_on\\_international\\_climate\\_agreements.html](http://belfercenter.ksg.harvard.edu/project/56/harvard_project_on_international_climate_agreements.html)

Yamin consider that the climate change regime is inexorably headed towards an expanded, permanent structure, akin to the World Trade Organization. In any case, despite all its shortcomings, they consider that a global regime is the only politically realistic alternative to dealing with the (global) climate change problem.

A closely related approach has been to assess the regulatory consistence of the current climate change regime. The starting point is that regulatory schemes may fail even if they have political support, because of lack of coherence among its structural, compositional, and administrative elements. There are of course many levels of legal and regulatory coherence, including systemic, policy, and instrumental coherence. Feaver and Durrant assess the current climate change regime and end with a rather negative judgment on its degree of basic coherence (Feaver and Durrant 2008). Systemic coherence is lacking because political negotiations do not reflect yet scientific findings; policy coherence is lacking because market instruments are designed to protect economies from the negative impacts of environmental policies rather than to achieve substantial emission reductions; and instrumental coherence is lacking because the institutional and administrative structure of the regime is extremely complex and functionally designed to suit market instrument needs, which themselves are misaligned with the fundamental goal of climate change law.

Other authors start from a broader viewpoint by claiming that the current international climate change regime has to be understood and placed in the light of the preexisting, and highly fragmented, international (environmental) law context, and explores ways to address potential interactions among different regimes (Harro Van Asselt 2008).

Van Asselt et al. explore the possible legal nature, content and functions of the principle of systemic integration. This principle would probably have first a political nature—in order to avoid conflictive integration among regimes—but could overtime evolve into a principle of international law.

Another proposal would be to create an International Environmental Organization (IEO) with comparable breadth and responsibility than the WTO

or the International Labour Organization (ILO). An IEO could help mitigation procedural and substantial fragmentation by bringing together different treaties under an umbrella agreement and by creating an overarching institution that can enunciate agreed principles, rule-making procedures, dispute settlement and effective enforcement and compliance procedures (Carlarne 2008). An IEO would also remedy the inability of current systems of international environmental law to cope with complex global problems such as climate change. However, it must be noted that many commentators are either skeptical that an IEO will ever exist or expressly against it.

Finally, some law and policy scholars have attempted to assess the current climate change regulatory framework from an ethical perspective. In legal and philosophical works, one important starting point is the recognition that many theories of distributive justice exist, diverging on the subjects, the objects and the criteria for the distribution. International relations are often seen from a realist perspective where states are only concerned with present generations of people within their borders, a view that is challenged by those defending cosmopolitan views of justice (Caney 2006). Depending on the view of distributive justice adopted, assessments of the current regime will be very different. Adopting a virtue ethics perspective, the current regime is found wanting in many respects by authors such as Brown. He has analyzed the positions of most countries in the international negotiations at Copenhagen (see below for a closer analysis of those negotiations) and has found that many of them are crudely based on furthering perceived national interests with little or no concern for the needs of other countries (Brown 2010).

After this broad overview of the literature on the international climate change regime, it is fitting to look at the past two years of international climate change negotiations to get a sense of the underlying trends there, in order to reflect on how the climate change regime might evolve in the next twenty years.

### **7.3. Trends in the international climate change law**

One way to identify emerging trends in international climate change law is to look in some detail at the evolution of the international negotiations in the last years. Another is to focus on different models of climate change governance

that are emerging within and in parallel to those negotiations and which are reflected to some extent in legal instruments. This section will address in more detail the former, but will also consider the latter.

### **7.3.1. The international climate change negotiations**

In 2007, the international community gathered in Bali under the UNFCCC and the Kyoto Protocol in order to kick-start the post-2012 climate change regime.<sup>6</sup> The EU goal was to agree upon a legally binding and comprehensive international agreement—in term of coverage and greenhouse gases—that would become applicable in 2012, after the conclusion of the first commitment period of the Kyoto Protocol. Such a regime should impose mitigation obligations upon all countries except the LDCs, and should cover adaptation, finance and technology transfers from rich to poor countries. However, after 2 years of very intensive negotiations, the states meeting in Copenhagen within the 15 COP to the UNFCCC, merely managed to ‘take note’ of the Copenhagen Accord, and the EU has made clear its deep disappointment with the outcome.<sup>7</sup> There it could be seen that different blocs of states had very different expectations as to the final outcome, with the G-77 focusing on securing an amendment of the Kyoto Protocol limited to providing for a second commitment period. The G-77 was however split on whether the Bali Action Plan should lead to a legally binding outcome, with AOSIS countries in favour by China, India and Brazil opposed to anything other than COP decisions. The USA was at that time ambivalent about the outcome.

The Copenhagen Accord was negotiated by 28 heads of state, chosen as representatives of the major regional groups (Africa, AOSIS, the EU, etc.). The negotiations were conducted as informal consultations under the personal authority of the COP president, following a failure by the COP, at the start of the High Level Segment, to agree a formal mandate for ministerial

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<sup>6</sup> I am extremely grateful for the detailed comments provided by one reviewer on the development of the international climate change negotiations. Any shortcomings and mistakes remain my own.

<sup>7</sup> See the statement of President Barroso on the Copenhagen Climate Accord, 19 December 2009. Available at <http://europa.eu/rapid/>. Last accessed 15 June 2010.

level discussions of the outcome of the work of the Ad-Hoc Working Group on Long-term Cooperative Action (AWGLCA). At the start of the High Level Segment, the AWGLCA chair reported on the work done to that point, and forwarded his conclusions to the COP President for action by the COP. The assumption underlying the negotiations was that the Accord would be adopted as a COP decision, but several states objected to it (Sudan—no longer representing Africa or the G-77—Cuba, Venezuela, Nicaragua and Bolivia), and as a result the COP merely ‘took note of’ the Accord. This obviously means that the legal value of that document is lower than that of a COP decision. However, it must be noted that the text of the Accord became an annex to COP decision 2/CP.15, which made possible for the Secretariat to administer pledges by signatories to the accord, and for its text to be fed into future negotiation texts.

On a positive note, it has been argued that the Copenhagen Accord embraces the fundamental issues that a future international climate change regime needs to tackle: a long-term shared vision on mitigation, action by developed and developing countries, transparency in MRV, and scaled up financial transfers from developed to developing countries. It moreover recognizes the scientific view that, in order to avoid dangerous anthropogenic interference with the climate system, the increase in global temperature should be below 2 degrees Celsius. In addition, it even mentions the need to consider, in the assessment of the implementation of the report, to be carried out by 2015, whether the increase in global temperature should be kept at 1.5 degrees Celsius.

From this perspective, some argue that the Copenhagen Accord constitutes an improvement vis-à-vis the Kyoto Protocol, since it establishes a framework for involving key, rapidly developing countries, and gives attention to the long-term path of emissions. In this vein, some have gone as far as to consider the Copenhagen Accord the best of all possible outcomes, reflecting a political consensus on the main elements of a future framework among the major emitters and representatives of the main negotiating groups (Zhang 2010). Rajamani has rightly noted that the Accord creates principled expectations of

the states that have negotiated it, and has managed to get endorsement by 138 states (Rajamani 2010).

On a more negative note, the Accord is rather vague in relation to all its elements, and moreover it is not clear how it can be linked to the UNFCCC process. It indeed quantifies targets for developed countries in Appendix 1, while actions of developing countries are less precisely laid down. However, it does not state how the burden will be shared among countries, does not indicate a benchmark from which the 2 degrees increase is to be measured, and fails to prescribe a peaking year or time frame.

Regarding targets, the US was reluctant to commit to a clear target, because the Senate has not yet passed a bill. Nevertheless, on January 2010 it sent a letter to the UNFCCC Secretariat submitting its emission reduction target for 2020, which would be 'in the range of 17 per cent, [as compared to 2005], in conformity with anticipated U.S. energy and climate legislation, recognizing that the final target will be reported to the Secretariat in light of enacted legislation'. China has not been very forthcoming because it could not profit very much in exchange of agreeing on targets. Nevertheless, it must be noted that China sent a letter on the 28 January 2010 to the Executive Secretary, noting, i.e., that it would 'endeavor' to lower its carbon dioxide emissions per unit of GDP by 40—45 per cent by 2020 compared to 2005, would increase its share of non-fossil fuels in primary energy consumption to around 15 per cent by 2020, and would increase forest coverage by 40 million hectares by 2020 in comparison with 2005 levels. Of course, these actions are of a voluntary nature and will be implemented in accordance with the principles and provisions of the UNFCCC, in particular article 4.7.

Regarding burden sharing in mitigation, the Accord asks developed countries to make emission reduction commitments and developing countries to put in place mitigation and adaptation measures. As of 4 September 2010, 42 developed countries and 43 developing countries have notified the UNFCCC Secretariat of commitments or actions to be inscribed in Appendix I or II of the accord.<sup>8</sup> Substantial academic effort has gone to estimate the effects of those

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<sup>8</sup> UNFCCC/KP/AWG/2010/INF.2.

pledges, if fully realized, in global average temperatures, and has concluded that: (i) the pledges will be unable to avoid dangerous climate change (OECD 2010); (ii) parties have not even agreed on the level at which emissions should be stabilized, or the maximum acceptable increase in global average temperature. In addition, the Accord neither requires comparability across targets or actions nor does it prescribe aggregate or individual reduction targets, whether in the mid- or long-term. Moreover, while it asks non-Annex I parties to conduct MRV of mitigation actions and to report them through more frequent national communications, which will be subjected to international consultation and analysis, it fails to elaborate on the modes and processes for that consultation and analysis, and does not specify who will run with the costs of more frequent national communications. On the other hand, it requires that the delivery of emission reductions and financing by developed countries is measured, reported and verified in accordance with existing and future guidelines adopted by the COP, so as to ensure a rigorous, robust and transparent accounting. Nevertheless, it should be noted that there remains a lot of ambiguity regarding enhanced financial transfers by developed to developing countries. As Timmons Roberts, Stadelmann and Huq clearly notice, crucial issues that need to be clarified as well include the sources of funding, whether they are truly new and additional, who defines what is climate finance and how is it defined, how it is counted, and whether it is predictable or not (Timmon Roberts 2010). More problematic is the underlying stance of both developed and developing countries. While the former have made their association with the Copenhagen Accord conditional upon developing countries making 'comparable' efforts, developing countries insist upon the voluntary—and based on external support—nature of their actions. As Rajamani notes, these conditions may cause the unraveling of the finely balanced compromises reached in the Accord leading to the eventual dissolution of the entire regime (Rajamani 2010).

Indeed, the literature shows that COP-15 illustrated four specific and deep problems running within the UNFCCC framework:

- The very large number of countries involved

- The widely varying degrees to which these countries contribute to and are affected by the problem to be addressed
- The polarization between economically developed and developing nation
- The rules for the adoption of decisions.

However, there is no agreement regarding possible solutions to these problems, and different scholars have read the consequences of the Copenhagen Accord for the future of the international climate change regime in different ways:

Some commentators consider that COP-15 was characterized by a strong North-South divide, made worst by the procedural chaos in which negotiations evolved. Clearly, the Copenhagen Accord has shown a range of problems associated with having the UNFCCC as the main venue for climate negotiations, and has reinforced doubts regarding the adequacy of the UNFCCC as the primary institutional venue for global climate change negotiations, leading to ask whether other venues should complement it or even substitute it. Stavins has suggested focusing on alternative approaches such as the Major Economies Forum (MEF), created by the US and bringing together Australia, Brazil, Canada, China, the European Union, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, Russia, South Africa, the United Kingdom, and the US. An advantage is that these countries and regions account for some 90 per cent of global emissions. Among the disadvantages one can count the risk that the move may create concern among other (excluded) countries, may not solve totally leakage, and that the MEF is currently not recognized by its own participants as a forum for negotiating legally binding agreements. Another option would seem to be the G-20 'the group of twenty finance ministers and central bank governors' established in 1999 to bring together the leading industrialized and developing countries to discuss key issues. It brings together all the nations included in the MEF plus Argentina, Saudi Arabia and Turkey. Since the G-20 is a venue to discuss economic and finance policies, it might bridge one of the divides in the climate regime and contribute to further progress. Yet another option

would be to focus on developing bilateral and multilateral approaches on specific issues, such as on technology cooperation (including issues such as carbon capture and storage (CCS)). This approach can however generate perverse incentives on developing countries, and might larger transaction costs than multilateral treaties. For all these reasons, the literature suggests that it is unlikely that these alternatives will fully supplant the UNFCCC, which moreover enjoys wide support and international legitimacy, which are key requirements for the implementation of treaties. Nevertheless, given its current problems, one possible development is towards a set of overlapping regimes or 'customized multilateralism'. Not all experts agree on this assessment though. Notably, Yamin and Depledge, as shown above, consider that the UNFCCC regime can be amended to solve many of these problems, except perhaps for changes to the voting procedure and the introduction of further differentiation among developing countries. This notwithstanding, some voices have cautioned the possibility that the international climate change negotiations might end up failing repeatedly in a similar manner than the Doha Round within the WTO.

Reflecting in part the more skeptical attitudes that have arisen post-Copenhagen, countries such as the UK are starting to move their attention towards alternative negotiation forums, such as the Major Economies Forum and the G-20. The EU remains committed to pursue a robust and effective legally binding international agreement under the UNFCCC (European Commission 2010, 4). At the same time, it seems to imply that perhaps the UNFCCC is not the right place to reach an agreement about the development of a global carbon market, and is ready to pursue this further through agreements with interested countries, both developed and developing (European Commission 2010, 12).

To conclude this section, some authors, by looking at the evolution of the international negotiations to date, have identified a progression towards a multi-track framework in which different countries or groups of countries assume different types of commitments or actions along different tracks (Bodansky and Diringer, 2007). This is complemented with parallel or alternative initiatives that are briefly mentioned in the next section.



### **7.3.2. Models of climate change governance**

Literature focusing on possible developments of international climate change law has also sought to examine the broader picture, in order to identify and study developments outside the main negotiations conducted within the UNFCCC and which rely on international law to some extent (Dobriansky and Turekian, 2010). Prime examples are multilateral groups such as the G8+5 and the G20, the Major Economies Forum on Energy and Climate, and action-oriented partnerships such as the Asia-Pacific Partnership on Clean Development and Climate, the Renewable Energy and Energy, the Methane to Markets Partnership, the International Partnership for a Hydrogen Economy, the Carbon Sequestration Leadership Forum, the Global Nuclear Energy Partnership and the International Thermonuclear Experimental Reactor (ITER). Also, there are examples of bilateral partnerships that seek to advance specific projects that leverage common areas of interest. This include the America's Strategic and Economic Dialogue with China, the U.S.-India Global Issues Forum, and several partnerships between the EU and developing countries, for instance to promote carbon capture and storage in China. Last but not least, development banks and NGOs are taking concrete examples to promote the transition towards a low-carbon economy, for instance through specific Funds that work as public private partnerships and through voluntary carbon trading schemes.

An important question that cannot be explored here is how these initiatives interact with the UNFCCC. In any case, it seems that the UNFCCC is unique in that it provides the broadest possible representation, a continued forum to negotiate and learn from each other, and the possibility to coordinate many different international initiatives in order to ensure transparency and avoid duplication of efforts.

### **7.3.3. Interim observations**

From the foregoing, we can conclude that there is a high degree of uncertainty in the literature as to how international climate change law might evolve in the next 20 or 30 years. To be sure, some trends can be identified

which have been noted above, which form a rather complex picture where thousands of actors interact at different levels and in different fora. Of course, there is no guarantee about the degree of success of all these actions in mitigating climate change, and that is why it seems valuable at this point to think in terms of potentially very different scenarios of the future. Although there have been some efforts, the most known being the IPPC SRES, to try and imagine alternative developmental paths and their impacts on the climate, none of those efforts include scenarios on the likely evolution of international climate change law. This is what the next sections will seek to do in a tentative and preliminary fashion by putting forward a number of scenarios.

## **8. Pulling the threads together: developing future scenarios to think about the evolution of international climate change law**

The purpose of this section is to build upon the insights gathered so far in order to briefly sketch five different scenarios that will allow reflecting how international climate change law might develop under each one of them in the next 20 years. In that way, it should be possible to imagine the main impacts that such legislation would cause among the key areas of concern. The scenarios are inspired in the four scenarios developed by Berkhout et al. (Berkhout, Haug et al. 2010). In thinking about the possible evolution of climate governance within the EU, and how it could respond to developments in international climate change governance, they elaborate four possible scenarios in which international governance could evolve: (1) coordinated mitigation; (2) autonomous mitigation; (3) coordinated adaptation; (4) autonomous adaptation. A fifth scenario is added here to give more emphasis to the possibility that coordinated mitigation is achieved outside the UN.

### **8.1. Coordinated mitigation: an international climate change organization under the UNFCCC**

This first scenario assumes in essence that the world is able to cooperate meaningfully in order to mitigate climate change to such an extent that the

need for adaptation is not too large. The current climate change regime continues, though undergoing substantial change. It embraces the key pillars of the Bali Action Plan and the Copenhagen Accord, namely a shared vision on mitigation, mitigation commitments from both developed and developing countries, a clear and stable regulatory framework governing transfers of financial resources and technology, strong attention to the adaptation needs of developing countries, and a strong compliance regime at international level covering all the essential elements.

The main legal elements of this scenario would be as follows:

- One or a few<sup>9</sup>, legally binding, international climate change treaties, covering the key elements of the Copenhagen Accord (a long-term vision, mitigation, adaptation, financing and technology transfer, and MRV provisions).
- A global or close to global and comprehensive (in terms of sectors and gases) carbon market.
- Broad agreement on burden sharing, whereas in a bottom-up or in a top-down fashion. The specifics of burden sharing would be sorted out probably in a way that favors the BASIC countries and the US. The EU would participate with very stringent emission reduction commitments and large transfers of financial resources and of technology toward developing countries. This could be done to a large extent through a global carbon market, which would progressively develop covering new countries and sectors (shipping, aviation), although a formal legal framework to deal with financial obligations would be in place.<sup>10</sup>

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<sup>9</sup> In the literature it is sometimes suggested to treat chlorofluorocarbons under a different regime (akin to the Montreal Protocol on the Ozone layer) than the rest of greenhouse gases, in order to increase efficiency. See Barrett, S. (2009). "Rethinking Global Climate Governance." Economics 3(5): 1-12.

<sup>10</sup> The current situation of financial support is fragmented, complex and utterly insufficient to enable the transition to a low carbon economy. See for instance Stewart, R. B., B. Kingsbury, et al., Eds. (2009). Climate Finance: Regulatory and Funding Strategies for Climate Change and Global Development. New York, New York University Press.

- A strong and credible compliance regime, covering all the aspects of the Copenhagen Accord.

From an institutional and architectural perspective, this scenario assumes that the principle of systemic integration permeates international environmental law, and the IEO has either been achieved or is much closer to being realized than it is the case today.

As a result of the progressive implementation of the regime, climate change is substantially mitigated, minimizing the need for adaptation policies. In sum, the occurrence of this scenario would mean that the current strategy of the EU has been largely successful.

## **8.2. Coordinated mitigation outside the UN**

The second scenario suggests a world where the largest polluters are able to come together and devise common approaches to mitigation, yet largely outside the auspices of the UN. This reflects the shift in global power and trade mentioned in section 5.2 above, where China and India among others have to a substantial extent succeeded in having their interests largely shaping the international climate change negotiations.

The main legal elements of this scenario are as follows:

- There is agreement among participating countries on burden sharing in mitigation, which tends to follow current Chinese and Indian views on per capita consumption as the main criterion for allocation. This criterion would effectively focus on country emissions on the basis of consumption, not production as currently envisaged by the Kyoto Protocol.
- A global carbon market is in place, covering the largest emitters on a sectoral basis, with substantial 'hot air' allocated to large developing countries. This removes to an extent concerns about impacts on competitiveness within developed countries. Least developed countries' participation in the carbon market is marginal.

- Adaptation is central to the regime, but since it takes place outside the UN, the needs of least developed countries are not recognized.
- There is no legally binding compliance regime in place, although a system to compare emission targets and a mechanism for the MRV of policies and measures has been agreed upon.

From an institutional and architectural perspective, this scenario is rather different than the previous one, because agreement would be achieved outside the UN (it could be achieved within the G-20 instead). Whether this outcome would marginalize the UN is difficult to predict, but the risk is that, if the agreement is not robust, i.e., because it fails to take into account the interests and needs of the most vulnerable countries, the latter may feel marginalized, something which could destabilize global governance. Democratic accountability and inclusion of all voices could therefore be undermined under this scenario.

From an environmental perspective, this regime achieves substantial mitigation, but might fail to give adequate attention to the interests and needs of the poorest states.

### **8.3. Autonomous mitigation**

The period leading to the Copenhagen negotiations described in section 7.3 above suggested that it is not clear that the path leading to a post-2012 agreement will be similar to the one that led to the adoption of the Kyoto Protocol. Indeed, some developed countries have rejected the ‘top-down’ approach followed by the Kyoto Protocol. Others, which supported strong rules and institutions during the Kyoto negotiations, have been disappointed by the performance of the Parties and the institutions they created under the Kyoto Protocol. Moreover, efforts by developed countries to include more specific commitments by developing countries have dampened the enthusiasm of developing countries for a legally binding regime with a strong compliance mechanism. As a result, confidence in UN led processes has largely disappeared, and has not been replaced by alternative approach to global climate governance. As suggested by progress in the MEF, the

emphasis in this scenario lays more on the legal character of domestic rules and the capacity of national institutions as the main engines of implementing and enforcing climate change policy (Werksman and Herbertson 2009). The US has a major influence in this move away from internationalism, but also China and India may rely on sovereign related concerns to promote domestic policies and domestic review of those policies, rather than accepting an international climate regime. This bottom-up approach would include the following legal instruments:

- A high level of reliance on domestic climate change policies, which would be partially agreed upon at international multilateral forums, and perhaps linked to each other to some extent afterwards. This scenario could progressively lead to the adoption of an international climate change regime, thanks to the push of non-state actors, particularly in the US.
- A key legal issue here is the 'comparability' of efforts among developed and major developing countries, which generates strong concerns about 'leakage' and leads to frequent tensions in the ambit of international trade.
- A lack of an international compliance mechanism. Compliance with domestic targets would be determined according to domestic procedures. In the absence of an international compliance system, countries could resort to trade related measures to punish those countries that are perceived to be doing less than enough. This approach to compliance increases the risk of conflicts between the climate regime and the WTO, since the Dispute Settlement Body could eventually be required to rule on the legality of a climate related trade measure. Such a bottom up approach could also lead to, i.e., performance-based financial mechanisms and carbon markets that would reward countries on the basis of unilateral assessments of country commitments and compliance. The consequences could be, unless states make strong efforts of coordination, loss of trust among

states and a race towards a trade war that would reduce global trade and therefore economic growth.

- Limited attention by developed countries to the needs of least developed countries. Indeed, in the absence of a comprehensive agreement, developed countries will tend to focus on achieving stable agreements with major developing countries, and will tend to discount those states whose emissions are lowest.

From an institutional and architectural perspective, this scenario assumes that international environmental law has become even more fragmented than in 2010, with the result that clashes between different regimes are constant and there are no effective mechanisms in place to address them. The idea of an IEO is very far from becoming a reality.

From an environmental effectiveness viewpoint, this scenario might generate sufficient mitigation to avoid the worst impacts, as long as states implement stringent and effective mitigation policies. But the extent to which this can happen is unclear, given the degree of fragmentation and ensuing tensions. Two issues that are particularly relevant from a legal perspective may become prominent in this scenario (although they will likely exist in any scenario): the use of litigation as a policy tool, and the possible resort by the international community (or some of its members) to geoengineering. The potential role of each is briefly assessed here.

## **Climate change liability**

A failure by (some) developed countries to engage into substantial mitigation efforts may lead to numerous legal challenges before international and domestic courts against them and against large companies, whether coming from other states, NGOs, or citizens.

Climate change litigation is already burgeoning at different levels. Ghaleigh has identified four categories of climate related litigation: (1) defensive; (2) promotive; (3) boundary-testing, and; (4) perfecting (Ghaleigh 2010).

Defensive litigation takes place in jurisdictions that do not currently have a climate change regulatory framework in order to make sure that the status

quo prevails. Promotive litigation would take place in the same jurisdictions but with the opposite goal in mind. Boundary-testing litigation takes place in jurisdictions with a climate change legal framework in place, in order to set more clearly the limits of the regulatory framework (i.e. litigation taking place in the context of the EU ETS). Finally, perfecting litigation has as its main goal to raise even higher the environmental performance of an existing climate change regulatory framework.

Ghaleigh suggests that a trend can be discerned in that climate related litigation follows a progressive move from (1) to (4). This trend might suggest that states are progressively adopting and implementing climate change mitigation policies. It obviously does not suggest that the reason they are doing so is the threat of being sued in courts of law. In any case, it is clear that climate change litigation per se is no alternative to climate change policies, and can at best play a complementary role, which should however not be totally discarded. (Faure, Nollkaemper, 2007).

## **Geoengineering**

Geoengineering methods can be usefully divided into two basic categories: carbon dioxide removal (CDR) techniques and solar radiation management techniques. CDR techniques address the root cause of climate change by removing greenhouse gases from the atmosphere. Solar radiation management techniques attempt to offset effects of increased greenhouse gas concentrations by causing the Earth to absorb less solar radiation (Several 2009). The particular characteristics of some geoengineering techniques make them a potentially very attractive alternative (or complement) to more conventional mitigation options, particularly in a context of lack of cooperation among states at international level. In particular, under certain configurations geoengineering can be undertaken as a single project, which might be relatively inexpensive while having a near-immediate effect on climate. All this means that some large countries that are likely to suffer serious impacts from climate change may consider putting forward unilateral geoengineering strategies to mitigate impacts. This is why it is examined

under this scenario, although it could be present under any of the scenarios contemplated in this report.

In general, the deployment of geoengineering solutions present a large number of challenges, including scientific, ethical, economic, environmental and legal ones, which could be exacerbated within this scenario, because states could engage in it in order to compensate for the failure of the international community to mitigate climate change emissions. It would moreover be considered by some states under conditions of international frustration and mistrust. Although the goal of deploying it would be to mitigate the impacts of climate change, there is no guarantee that it would be done in such a way that potentially negative impacts upon other states would be prevented or minimized. The way in which international law evolves in the next twenty years regarding the governance of geoengineering will determine which impacts can be expected in the future. At present, international law affords a large degree of freedom to states to initiate geoengineering activities, so long as the effects are contained within that state's territory (which could be the case with some CDR techniques) (Royal Society 2009, 40). But even then, certain provisions of international environmental law can be applicable, particularly those dealing with the protection of natural heritage. Of course, in the presence of transboundary impacts, further obligations under international law would certainly apply.<sup>11</sup> If in the next years an international regulatory framework is put in place that succeeds in properly regulating research and potential deployment, thereby minimizing potential risks and ensuring compensation for potential losses, then geoengineering might become a success story, i.e., by buying time to deploy other mitigation technologies. Otherwise, geoengineering may impact the world in ways that cannot be presently imagined. The literature has made some progress in identifying the key policy questions surrounding geoengineering that the international community needs to confront, and has outlined some of the initial steps that could be taken (Several 2009). Clearly, multidisciplinary research

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<sup>11</sup> Presently, international law is almost silent about geoengineering. See also Zedalis, R. J. (2010). "Climate Change and the National Academy of Sciences' Idea of Geoengineering: One American Academic's Perspective on Considering the Text of Existing International Agreements " European Energy and Environmental Law Review **19**(1): 18-32.

(including law) will be essential to get more precise knowledge about the potential risks and benefits of geoengineering.

## **8.4. Coordinated adaptation**

In this scenario, which in principle might look like a rather bizarre and unlikely outcome, could nevertheless arise if new science demonstrates that, while the impacts of climate change are not as costly as previously thought, the costs of mitigation are higher than originally thought, so that the rational behavior turns out to be adapting to climate change rather than mitigating greenhouse gas emissions. Some sort of international agreement would be in place with a strong focus on adaptation, although mitigation will still play a role. Such a regime's primary focus would be on identifying local impacts of climate change, agreeing upon burden sharing of adaptation costs, and establishing mechanisms to govern the transfer of financial and technological resources. Moreover, the attention is mainly upon the needs of the worst affected countries, in order to ensure that their inhabitants have their human rights protected. From a legal perspective, integration of climate change impacts into all areas of policy most vulnerable to climate change, including in areas such as infrastructure, agriculture, tourism, development aid, and the environment, are paramount. In particular, international law has developed to facilitate the migration of peoples<sup>12</sup> and species from endangered areas and countries into other areas and countries.

Although under this scenario one assumption is that climate change science has shown that climate related impacts are less serious than expected, nevertheless strong attention goes to identify 'tipping points' that could be caused by the higher global average temperature reached. In particular, the risk of abrupt climate change and associated damages receives sustained attention under international and particularly domestic law.

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<sup>12</sup> In 2010, climate refugees are not recognized as such under international law. See for instance Williams, A. (2008). "Turning the Tide: Recognizing Climate Change Refugees in International Law." Law and Policy **30**(4): 502-529.

## 8.5. Autonomous adaptation

This scenario is based on a highly fragmented and uncooperative world that has largely failed to reduce greenhouse gas emissions. The sense of frustration and mistrust between developed and developing countries is so marked that agreement on a coordinated and comprehensive approach to adapt to climate change is impossible. Since the impacts of climate change are already extremely severe and threaten to become catastrophic (see section 6 above commenting upon the arrival of an ‘age of survival’), the focus of states is on setting up largely unilateral measures to protect themselves against enormous and increasing climate change related damages. From a legal perspective, this includes ensuring sufficient access to natural resources (energy, water, food), in an increasingly unstable world. Military alliances are shaped to achieve these goals in a climate of growing instability and uncertainty.

From an institutional and architectural perspective, this scenario reflects a total failure of international law to grapple with climate change, and a predominance of realist approaches to international relations.

**Table 4: matrix of scenarios, degrees of coordination and degrees of effectiveness.**

		Degrees of coordination			
Extent of mitigation achieved		+	++	+++	++++
	+	AA		CA	
	++	AM			
	+++		CM2		
	++++				CM1

AA: autonomous adaptation; CA: coordinated adaptation; AM: autonomous mitigation; CM1: coordinated mitigation; CM: coordinated mitigation; CM2: coordinated mitigation outside the UN

Table 4 classifies the four scenarios developed according to two variables: the degree of coordination of states at international level that they entail, and the degree of environmental effectiveness (meaning mitigation) that they achieve. These variables are linked, since, as we noted in section 6.1 above, global environmental assessments conclude that a higher degree of cooperation among states will yield better environmental outcomes.

## 9. Impacts in key areas of legal developments within each of the scenarios

This section will link the scenarios developed above with the key areas of interest in order to discuss potential impacts that international law adopted under each of the scenarios could have upon key areas.

**Table 5: scenarios, legal developments and impacts on key areas**

Intensiveness of impact of future int'l climate change legislation in key areas												
		P	H	R C	GG	OI	NS	CI	KN	T S	FSI	Eth
Degrees of coordination	CM1	L	L	L	H	H	L	M	H	H	H	H
	CM2	M	M	L	H	H	L	M	H	H	H	H
	AM	H	H	M	H	M	M	H	M	M	M	M
	CA	M	M	H	M	H	M	M	H	H	H	M
	AA	H	H	L	H	L	H	M	L	L	L	H

P: people; H: health; R C: physical resources and commodities; GG: global governance; OI: overseas infrastructure; NS: national security; CI: global positioning and competitive advantage of firms; KN: knowledge; T S: technology and skills; FSI: financial services and insurance; Eth: social/ethics.

Table 5 links the five scenarios developed above (and the laws adopted therein) with key areas in order to enable an assessment of the impact of international climate law on those areas. Impacts are classified in a quantitative manner (high, medium and low) on the basis of the degree of deviation from the status quo which they give rise to. No attempt is made to make value judgments as to the desirability of those changes. In addition, this classification does not say anything about the nature and distribution of impacts; rather, it highlights those areas where we feel that impacts can be particularly acute—or have not received adequate attention—and therefore deserves closer scrutiny. Where an impact is described as high, a more detailed justification follows in the analysis carried out below.

## **9.1. Impacts related to the coordinated mitigation scenario**

Under a scenario of coordinated mitigation, the impacts of international climate law on overseas infrastructure, knowledge, technology and skills, financial services and insurance, and ethics are considered to be high, for the following reasons:

Achieving stabilization of GHG concentration levels at around or below 400 ppmv requires a deep transformation in global energy systems. According to all scenarios reviewed in this report, this will likely require broad deployment of CCS, nuclear energy—which might accentuate concerns about waste storage and about proliferation (Pring, Haas et al. 2008), renewable energy, and decentralized electricity. Inserting all these developments will require undertaking massive changes to current energy infrastructures worldwide.

For instance, the EU will need under this scenario to develop a truly integrated EU-wide smart electricity and gas grids (Dobbeni 2009). At the same time, security of supply considerations will require developing new interconnections with foreign energy systems. The UK energy grid will have been seamlessly integrated with an EU-wide grid. At the same time, achieving such a low stabilization levels will require a huge leap in the level of knowledge about and implementation of new low-carbon technologies,

alongside their massive transfer to developing countries. This will generate large amounts of new technological skills, which will also need to be transferred to developing countries. In so doing, the role of the financial services industry will be key in generating the necessary resources.<sup>13</sup> It is envisioned that a substantial part of these transfers will take place in the context of a global carbon market. Governing such a carbon market will be a great challenge, particularly taking into account that it will need to embrace a large number of states worldwide which are at very different stages of development, as well as a large number of gases and sectors, including aviation and shipping, which are not currently included in the Kyoto Protocol and therefore in international emissions trading. The literature has only started to consider these challenges (Mehling 2009), making links with attempts to introduce regulation dealing with financial institutions at global level. From an ethical perspective, global participation in an international climate change regime requires widespread agreement on burden sharing principles and solutions. Achieving such an agreement will require a large measure of sacrifice among presently developed countries, since they might have to reduce their emissions to negative levels and moreover transfer large amounts of resources to developing countries. Moreover, adaptation will receive under this scenario as much attention as mitigation, although the needs for adaptation will not be too large. Therefore, this option scores very high in terms of concern about peoples in other countries and about future generations, suggesting a move towards a common acceptance of the concept of cosmopolitan justice (Caney 2006). Linking this discussion with the observations made above about current trends in international law, this would represent a clear move away from a Westphalian understanding of the world towards a more cosmopolitan one (Harris 2008).

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<sup>13</sup> At this point there is skepticism in the literature about the ability of the financial markets to promote environmental protection. See for instance Arup, C. (2010). "The Global Financial Crisis: Learning from Regulatory and Governance Studies." *Ibid.* **32**(3): 363-381.

## **9.2. Impacts related to the coordinated mitigation outside the UN scenario**

This scenario introduces deep changes to current global governance mechanisms, which might become less stable, at least for some time. In this scenario there is an important role for a global carbon market that covers the largest emitters on a sectoral basis, with substantial 'hot air' allocated to large developing countries. This removes to an extent concerns about impacts on competitiveness within developed countries. Since this scenario also achieves large emission reduction levels, it requires profound changes in the global energy system, akin to those foreseen in the first scenario. Therefore, impacts on overseas infrastructure will be high. Knowledge levels and technological skills will likewise be increased substantially, but in this case transfers may only or mostly take place among developed countries and major developing countries (the BASIC), while least developing countries may be left aside, reflecting their lower contribution to global emissions and their limited power. The financial sector will thrive under this scenario thanks to the development of a global carbon market, which might develop at sectoral level but may develop links progressively. At the same time, given its narrower coverage than under scenario one, the impact will be correspondingly lower. The impacts of international law on ethics will be medium: on the one hand the substantial levels of mitigation achieved will limit the need for adaptation policies; on the other hand, the carbon market may or may not benefit directly least developing countries, although this will depend, i.e., on the evolution of the CDM. If mechanisms like REDD (reduced emissions from deforestation and forest degradation) thrive and remain linked to the global carbon market, then developing countries might benefit.

## **9.3. Impacts related to the autonomous mitigation scenario**

Under the third scenario, countries fail to arrive to an agreement on burden sharing in mitigation, which leads to the loss of relevance of the current UN climate change regime and also prevents substantial agreement in alternative forums. However, climate change remains a concern, particularly for states

that are worst affected. Nevertheless, global emissions keep rising, although at a lower level than in the scenarios focused only or mainly on adaptation. For this reason impacts on people and health are higher than in the previous scenarios.

Concerns about energy security of supply and the desire to prevent further destabilization in global governance lead many countries to put in place policies that achieve mitigation, which are however largely disconnected from each other. While some cooperation will still take place, it will occur mostly through multilateral and bilateral agreements. A patchy and very fragmented framework is in place. Current shifts in global governance mean that BASIC countries are able to increasingly impose their conditions in those agreements, which hence tend to reflect their priorities and interests. If those conditions are not acceptable for developed countries, then the potential for agreements will be reduced. As a result, concerns about potential impacts of legislation upon the global positioning and competitive advantage of firms rank high, and it is possible that countries seriously engaged in mitigation decide to couple their domestic policies with trade related measures such as border tax adjustments. This might lead to an increased role for the WTO Dispute Settlement Body in determining the legality of climate change policies. This mere possibility may act as a sufficient deterrent for countries considering adopting stringent mitigation policies, and therefore lead to a reduction in the environmental effectiveness of those policies. But another possible development could be the increasing judicialization of climate change policy, with legal challenges more frequently brought against states and large private polluters. Current literature tends to see the role of litigation as a valuable complement of other law and policy efforts because it fosters needed interaction across levels of government and different time periods (Osofsky 2010). However, in the absence of comprehensive and consistent approaches to mitigation, the contribution of litigation is limited.

Transfer of technology in the ambit of CCS and nuclear energy plays a key role in this scenario, the latter leading to increased concerns about global insecurity. Global governance might struggle to guarantee global security, and countries may resort to develop stronger military powers or to search for new

alliances. In addition, some countries that consider themselves particularly vulnerable to the impacts of climate change might consider putting in place geoengineering solutions. Depending on the technologies adopted, geoengineering might have negative global consequences. However, in 2010 there is no comprehensive approach to geoengineering. Therefore under this scenario there might be strong efforts at international level to put in place an international treaty regulating the who's, the what's and the how's of geoengineering. Due to the possibility that this option might materialize, impacts upon peoples and health might be high.

#### **9.4. Impacts related to the coordinated adaptation scenario**

Under this scenario, a comprehensive international law regime on adaptation to climate change is in place. Agreement has been achieved on burden sharing between developed and developing countries (and between most and least vulnerable countries to climate change). Although a carbon market might still exist, it will not mobilize as much resources under the scenarios of cooperative mitigation; therefore there is a larger role for transfer of public funds.

Another issue that generates impacts on the financial services and insurance sector is the need to set up mechanisms for compensating victims of climate change. Even if science finds that damages are lower than originally thought, impacts can still be considerable and require large amounts of compensation. This raises questions about the capacity of insurance markets to deal with the payments, and states may have to come to their rescue by entering the picture as co-insurers or reinsurers of last resort. Victims of climate change will also conform the core of multilateral negotiations on (climate related) migration. While some states might be the natural destinations of peoples escaping from increasingly uninhabitable countries (particularly low-lying states), there will be a need to regulate that migration and to compensate states absorbing most of it. This might be done under the banner of burden sharing mentioned in the previous paragraph.

A third focus of domestic and international law will be to ensure the continued availability of natural resources such as energy, water and food as well as of the resilience of the infrastructures needed to deliver them. Given the high degree of international coordination under this scenario, the negotiation and adoption of international treaties dealing with those resources are likely to have been concluded. Those treaties will focus on issues on securing the availability of, regulating access to, and sharing of, those resources. While water would likely be subjected to regional treaties<sup>14</sup>, energy and food may be the object of global treaties, building to some extent on initiatives existing today, given the universal public good elements of both resources. A particular focus of attention will be the continued resilience of infrastructures in the face of more acute (but not catastrophic) impacts. Impacts such as raising sea levels, more intense and more frequent storms, and droughts, will impose increasing stresses upon existing infrastructure, which will require both domestic and international action, given the transboundary nature of large portions of energy and transport infrastructure.<sup>15</sup>

## **9.5. Impacts related to the autonomous adaptation scenario**

This scenario depicts an increasingly unstable, unpredictable and anarchical world that is brutally changed by climate change. Because global governance is in total disarray, the degree of cooperation is very low, mitigation levels are correspondingly low, and no global strategies are put in place to increase resilience in the face of potentially catastrophic impacts. In this world, the loss lies where it falls. Impacts on people and health are the highest, overseas infrastructure suffers to the point that some countries and regions become isolated and unproductive, and concerns about national security in the face of

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<sup>14</sup> In contrast with the naturally vague and occasionally contradictory global declarations and principles, the local and regional institutions developed by coriparian nations have focused on specific, basin-level conditions and concerns. The Food and Agriculture Organization of the United Nations has identified more than 3,600 treaties relating to international water resources dating from 805 to 1984, the majority of which relate to some aspect of navigation. Since the 1950s, more than two hundred agreements have been developed that address non navigational issues of water management, including flood control, hydropower projects, or allocations for consumptive or non consumptive uses in international basins.

<sup>15</sup> The importance attached to this issue can be seen for instance in the fact that UK EPSRC has currently an open call in the area of adaptation of energy infrastructure to climate change impacts, namely the Energy Networks Grand Challenges call for proposals.

massive migratory movements and disputes about resources take centre stage. The UN fails to channel tensions and confrontations are likely to arise. This is also a world where the most powerful imposes its ethics upon the rest. Given that the most powerful may well turn out to be China and India, this might be an extremely different world than the one we now know.<sup>16</sup> Also countries that stand to gain from an increase in global average temperature (such as Russia) might increase their might. International law will look very fragmented under this scenario, increasingly described by ‘fortress’ countries and regions holding relations based on power, not on diplomacy and the rule of law.

## **10. Final remarks on the relevance of the foregoing scenarios on the development of international climate change law for the United Kingdom’s adaptation response**

This report has shown that presently there is much uncertainty in the literature about the future evolution of international (climate change) law. Nevertheless, the scenarios developed allow thinking about possible impacts of law upon key areas of concern for the UK that might require a response. It of course needs to be stressed again that reality cannot be captured by any of these scenarios or by any combination of them. Scenarios are merely highly stylized representations of the future, with the aim of identifying key trends and predicting possible consequences and adequate responses. This section constitutes a preliminary assessment to characterize the main elements of such responses.

This section starts with some general remarks that apply to all scenarios and then makes some comments on areas in which the UK needs to place more attention, i.e. by devoting resources to further research.

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<sup>16</sup> For more in detail analysis on the impact of climate change on international security, see the FORESIGHT report prepared by Duncan Depledge.

- Most international climate change law will impact domestic law through the mediation of EU law, which will be increasingly relevant under most scenarios (except in the autonomous adaptation scenario and perhaps in the autonomous mitigation scenario).
- Which one of the scenarios considered in this report turns out to materialize depends, i.e., on normative choices made from now onwards. The role of ethics in the development of international (climate law) has been noted above, with many authors calling for a progression towards a cosmopolitan international law. The ethical stance adopted so far by the UK in the international climate change negotiations and its impact on the evolution of international (climate) law hence deserves further exploration.
- Given the theoretically equal probability attached to all scenarios (although obviously some scenarios might look more likely than others, and indeed the UK may have a role in shaping probabilities, also through the EU), the UK should try to develop a strategy that remains robust under as many scenarios as possible. Some elements of this strategy will be considered after reviewing possible elements of a UK response to all the scenarios.
- Some possible developments in international law are consistent with all or most scenarios, such as the (fuller) development of a global carbon market and the possible recourse to (some) geoengineering techniques, and therefore deserve particular attention. Geoengineering might raise some unique challenges to international law, i.e., to the law of the sea, space law, and state responsibility and liability for transboundary harms that need to be explored in more detail (House of Commons 2010).

After these general remarks, it is necessary to address possible responses that the UK might need to consider under each of the scenarios considered above.

- In the coordinated mitigation scenario, impacts of law on sectors such as global governance, overseas infrastructure, knowledge, technology and skills, financial services and insurance industries, and ethics are

high. To achieve this world, the UK will likely have had to accept playing a leadership role in many of these areas, since it has comparative advantage in some of them (e.g., financial services and insurance, technology), and in others its choices can exert influence at global level (ethics). Particularly in the latter context a lot of effort will have been made in understanding the basic postulates of developing countries in relation to issues such as burden sharing and adaptation needs. The UK will also need to cooperate very closely with the EU when developing legislation and EU law will likely have important consequences for its financial and energy sectors.

- Under the coordinated mitigation scenario outside the UN, impacts are high on the same areas than in the previous scenario, although for different reasons in the area of global governance. While carbon markets are at the core of this world, which can benefit the financial and insurance industries, (unilateral) ethical choices regarding the design of domestic schemes might be more relevant than in the previous scenario, given the absence of a global regulatory framework. Given the likely continuation of the EU ETS, choices on how to link it with other domestic markets will need to be made at that level and those choices will determine to an extent the behavior of UK firms.
- Under the autonomous mitigation scenario, the range of impacts differs substantially from the previous scenarios. Here, people and health are much more affected (in part due to climate change and in part due to responses such as geoengineering), and the UK will need to consider strategies to deal with them. Also affected will be the global positioning and competitive advantage of UK firms, particularly if the UK continues to pursue a stringent mitigation target. The lack of a coordinated and systematic global approach might mean that many states might decide to couple climate change policies with trade measures, which will likely reduce global trade thus impacting negatively upon the UK economy. Also the relation with countries such as China, India and other developing countries will be key, in particular to adopt bilateral and

multilateral agreements that promote mutual interests in relation to mitigation and adaptation.

- The coordinated adaptation scenario is very different to the previous ones. Here, the highest impacts will fall upon physical resources and commodities, overseas infrastructure (in order to adapt it to climate change impacts), knowledge, technology and skills, and financial services and insurance (to finance adaptation measures domestically and abroad). The UK will need to consider carefully its involvement in developing sound knowledge of climate change impacts domestically and abroad, in deciding its position on burden sharing, in making sure that it develops the necessary expertise to adapt infrastructure (including energy infrastructure) to climate change, and in deciding how to managing issues such as migration and biodiversity under international, EU and domestic law.
- The last scenario is certainly grim but considered realistic in the literature. If by the late 2020's mitigation is not progressing fast enough, the UK might need to attach close consideration to (perhaps militar) alliances and strategies that will ensure its continued survival in the face of likely catastrophic impacts.

In sum, a robust response to the impacts assessed in this report would seem to feature the following basic elements: increasing the role of renewable sources of energy in the energy mix, integrating the UK energy electricity and gas frameworks more seamlessly into the EU system, promoting intensively energy efficiency, CCS, and nuclear energy at domestic and international levels, building a leading position in a future global carbon market while attending to the concerns of developing countries, putting more effort in understanding the positions of developing countries in international negotiations with the aim of building bridges between (presently) very disparate positions, increasing and strengthening trade and political relations with China, India and other emerging powers, adapting infrastructure to climate change impacts, and, last but not least, treating climate change as a security issue and considering military related implications should worst possible scenarios materialize. Of course, further research is required to

determine whether and to what extent these issues can be combined within a single strategy, how to justify it, and which trade-offs to make should it be necessary.

## **11. Conclusion and recommendations**

The future development of international climate change law is very uncertain, and depends of many scientific, technical and normative developments that are either not known at present or can be influenced by choices made now by the relevant actors. This report has assessed a number of scenarios of how international climate law could evolve in an effort to ascertain potential impacts on key areas that would require a response by the UK. In the light of the findings, it recommends the UK to develop a robust (legal and political) strategy that can allow itself to adapt to as many scenarios as possible. Particular attention should be given to understanding more in depth the needs and interests of developing countries in the context of climate change, particularly but not exclusively the most developed ones, to the role of ethics in its approach to burden sharing, to the progressive development of a global carbon market and the position of its industry therein, to geoengineering, and to further improve knowledge on the regional and sectoral distribution of climate impacts under different scenarios in order to start considering possible legal responses to them.

Risk/Scenario	Global/Regional Implications	Implications for UK (opportunities as well as threats)	
		threats	opportunities
Coordinated mitigation in UN	Global carbon market, substantial mitigation, possible use of some geoengineering techniques	Loss of competitiveness if UK does not take a leading role for itself in global carbon market	Many opportunities to lead in several key areas, i.e. global carbon market, export of low carbon technologies
Coordinated mitigation outside UN	Global carbon market, substantial mitigation, shift of power towards China and India, geoengineering	Fragmentation of international governance, unilateral geoengineering is possible,	Similar to scenario 1
Autonomous mitigation	Domestic climate policies lead to trade tensions, less cooperation on mitigation and adaptation, poorer countries stand to lose from changes in climate, geoengineering	Global governance more fragmented and unstable, trade conflicts,  threats to competitiveness if unilateral mitigation policies are adopted,  judicialization of climate policy, higher climate impacts due to lower levels of mitigation and thus more attention needed to adaptation,  climate as a security policy concern	If UK becomes leader in mitigation instruments and technologies such as CCS and geoengineering it can still benefit from engaging in (bilateral and multilateral) agreements to and export them
Coordinated adaptation	International agreement on adaptation, attention to needs of vulnerable countries, geoengineering	Damages from climate substantial, insurance markets may not be able to cope, climate related migration might be substantial	UK insurance industry may thrive, provided adequate regulatory frameworks are in place
Autonomous adaptation	International system fragments, massive climate impacts, security concerns, mass migrations, risk that geongineering techniques are implemented unilaterally	Need to frame climate change as national security issue to deal with growing instability, break down of many global markets, and political insecurity	

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