
INTRODUCTION

Climate change is the biggest global environmental challenge of the 21st century. Changes in the climate system that are having a significant impact on the environment and on human beings can already be seen today. Since the 1950s, our atmosphere and oceans have been warming, sea levels have been rising, and the amounts of snow and ice have diminished on a global scale (IPCC, 2014).¹ Today, human influence on the climate system is a scientifically confirmed fact: according to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), human activity is extremely likely to have been the dominant cause of this global warming. If humanity continues to emit substantial quantities of greenhouse gases (GHG), additional warming and other long-term changes are likely to occur. IPCC (2014: 64) estimates that these changes will increase the “likelihood of severe, pervasive and irreversible impacts for people, species and ecosystems” and would lead to “mostly negative impacts for biodiversity, ecosystem services and economic development and amplify risks for livelihoods and for food and human security.” Moreover, the IPCC estimates that these risks are generally greater for people and communities that are socially, economically or otherwise marginalized.

However, there is still scope for action. Humanity can limit climate risks through a substantial and sustained reduction of GHG emissions over the next few decades (IPCC, 2014). Sustainable Development Goal 13 of the United Nations 2030 Agenda for Sustainable Development calls for urgent action to combat climate change and its impact. This drive to structurally transform

our carbon-based economy into a low-carbon economy is now widely acknowledged by policymakers. At the 21st Session of the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, the international community adopted the Paris Agreement (see Box 1), which uniformly acknowledged the importance of climate change mitigation and adaptation actions to tackle this global challenge, and recognized the need “to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty” (Paris Agreement, Article 2, §1). Unlike previous international agreements on climate change, the Paris Agreement calls upon developed and developing countries to curb emissions while respecting the principle of common but differentiated responsibilities. The 196 participating parties (195 countries plus the European Union) agreed on an ambitious goal to limit global warming to “well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels” (Paris Agreement, Article 2, §1a). Limiting global warming to at most 2°C above pre-industrial levels would, according to IPCC (2014), lead to only moderate risks of global aggregate effects on biodiversity and humans. To achieve this objective, our carbon-based economy needs to be radically transformed into an economy based on low-carbon power sources. Such structural transformation would in turn reduce human-induced carbon dioxide (CO₂) emissions and thereby help reduce global warming. It could also unleash new opportunities for sustainable growth and development, and in turn reduce poverty.

¹The IPCC, founded in 1988 by the World Meteorological Organization and the United Nations Environment Programme, is the international entity that is assessing the science related to climate change. The panel is composed of hundreds of leading scientists who review the work of thousands of scientists. The IPCC regularly provides policymakers with assessment reports of climate change, observed and anticipated effects, and mitigation and adaptation options.

The Paris Agreement

The Paris Agreement¹ is the outcome of the 21st Session of the UNFCCC held in December 2015 in Paris which brings all its 196 parties under a common, legally binding framework. The agreement is open for signature and ratification at the UN Headquarters in New York from 22 April 2016 to 27 April 2017 and will take effect in 2020.

The Paris Agreement requires any country that ratifies it to act to reduce its GHG emissions in the coming century, with the goal of peaking global GHG emissions as soon as possible and continuing the reductions as the century progresses. Ratifying parties will aim to keep global temperatures from rising more than 2°C by 2100 with an ideal target of keeping the temperature rise below 1.5°C (Article 2, §1a). Ratifying parties will have to submit what are called Nationally Determined Contributions (NDCs), i.e. national commitments to reduce greenhouse gases. By the end of 2015, 188 NDCs had already been submitted. The agreement provides a mechanism that aims to increase the ambition of NDCs over time: it requires all countries to deliver, every five years, a new NDC (Articles 3, 4, 7, 9, 10, 11, and 13). Each new NDC should represent a “progression” over the prior one, and should reflect the country’s “highest possible ambition” (Article 4.3). This process is crucial, because current NDCs are not strong enough to limit warming to below 2°C. Moreover, the agreement states that countries will “engage in adaptation planning processes” (Article 9) to ensure that they are ready for the effects of climate change. To finance mitigation and adaptation efforts, the agreement places a legal obligation on developed countries to provide financial resources (Article 9.1) and invites wealthier developing countries to contribute as well. The overall implementation of the agreement will be assessed every five years, starting in 2023 (Articles 14.1 and 14. 2).

Unlike past climate change policy frameworks, which had limited scope and ambitious goals, the Paris regime is based on broad participation and relatively limited ambition at the initial stage. This change from limited to broad participation is important given the global nature of the climate change problem. The broad participation, together with the new architecture of the agreement that combines bottom-up NDCs with top-down procedures for reporting and synthesis of NDCs by the UNFCCC Secretariat, represents significant progress towards an effective climate policy solution.

Source: Author.

¹ The text of the Paris Agreement is available at http://unfccc.int/paris_agreement/items/9485.php.

This teaching material focuses on the ways and means to address our century’s biggest global environmental, economic and social, challenge: the structural transformation of our current carbon-based economy into a low-carbon economy. It provides readers with the necessary tools to analyse this challenge and assist them in devising appropriate solutions.

Module 1 offers a general introduction to the topic by highlighting the linkages between the economy and the environment. The module shows that the environment provides several services to the economy and demonstrates that the economic and environmental systems are connected and interdependent. It then explains that human use of the environment’s services can lead to environmental impacts such as climate change, and discusses factors determining the size of these impacts. Finally it underlines the importance of sustainable economic systems and concludes by discussing the role of trade as an enabler of sustainable development and poverty reduction.

Module 2 focuses specifically on the climate and climate change by familiarizing the reader with the climate science behind climate change. The

module discusses the different components of the climate system and shows that they are all influenced by the planet’s energy balance. It then explains that climate change can occur due to factors that are either internal or external to the climate system. External factors such as human activities can affect the climate by influencing climate change drivers such as atmospheric GHG concentrations, which in turn change the energy balance of the planet and thus affect climate. After reviewing different ways in which economic activities affect climate, the module presents the observed changes in the climate system and discusses the impact those changes have had on human and natural systems. It then outlines climate changes that are expected to occur in the future as well as their potential impact.

Following Module 1 and 2, which have covered the general links between the economy and the environment and explained how human beings can effect climate change, Module 3 introduces readers to the economics of climate change. The module demonstrates that climate change is arguably the biggest market failure in human history. It explains that the atmosphere is an open-access resource and that GHG emissions

are negative externalities. Firms and households produce GHG emissions as an unwanted by-product of their economic activities, without having to pay the cost of related pollution. Instead, they dump those gases free of charge into the atmosphere, thereby contributing to climate change, and thus, indirectly, imposing costs on present and future generations. The module concludes by highlighting that the reduction of emissions is a global public good, which generates incentives for nations to free-ride and avoid reducing their own emissions, and makes implementation of effective solutions to climate change a difficult task.

Module 3 showed that climate change is the result of a large market failure that can only be corrected by policy interventions at the global level. Over the past 25 years, the international community has not found a convincing solution to this market failure, and global greenhouse

gas emissions have continued to increase. Nevertheless, at the 2015 United Nations Climate Change Conference (COP21) in Paris, the international climate change policy framework took a new and promising direction. Module 4 provides an in-depth analysis of climate change policies and the international politics of climate change. It discusses the different policy instruments and technological solutions that could enable us to limit climate change and transform economies into low-carbon economies. It explains that, in parallel with policies aimed at limiting climate change, a society also needs to undertake actions to adapt human and natural systems so that they are better prepared for the anticipated impacts of climate change. The module then reviews key international climate change policy developments and discusses several issues surrounding the Paris Agreement, with a particular focus on the situation of developing countries.