

Afterword and avenues for future work

The present volume represents a first attempt at a comprehensive study of the impact of climate change in Greece – in particular of the cost of climate change that would be borne by the Greek economy, the cost of implementing adaptation measures, as well as the cost of moving to a low-emissions economy, in the context of a global effort to mitigate climate change. For the first time and for close to two years, this project brought together teams from different scientific disciplines; the teams included physicists of the atmosphere, climatologists and geophysicists, experts in agriculture, forestry and fisheries, as well as experts on water resources, tourism, the built environment and energy, not to mention economists and sociologists.

The study produced climate projections for Greece, in a detailed geographic breakdown up to the year 2100. These data are available to the research community. A series of sectoral studies analysed the biophysical impact of the anthropogenic (human-induced) component of climate change and estimated the costs of climate change, disaggregated by sector, across time horizons extending to 2050 and 2100. The findings of the sectoral studies were then incorporated into a general equilibrium model of the Greek economy, in order to estimate the overall cost of climate change in terms of changes in GDP, social welfare and sectoral output. The sectoral studies also helped define the scope for adaptation to climate change through preventive measures. The next step was to assess the total cost for the Greek economy of adaptation measures, as well as the cost savings that can be achieved thanks to these measures, given that the damage from climate change would be reduced.

Using a mathematical model designed for the energy sector and industrial processes, researchers considered scenarios of drastic reduction in greenhouse gas emissions in Greece in line with current European Union policy and objectives. The cost for the Greek economy of achieving emission reduction was estimated, together with the benefits of mitigating climate change, under the hypothesis of a global reduction in emissions. Taking the above into account, the cost and benefits for the Greek economy of an adaptation scenario and a mitigation scenario were calculated and were then compared with those of the inaction scenario (where climate change reaches high intensity as a result of no global action being taken). The estimates were made for the years 2050 and 2100, but also cumulatively for the period extending till 2100. The cost-benefit analysis showed that the mitigation policy was clearly a *better* option than the inac-

tion scenario, while the adaptation policy was also found to be of *benefit*. The study thus makes a clear case for taking action to reduce greenhouse gas emissions in line with the targets set by the European Union; it also points out the urgent need for work to begin on the formulation of a long-term strategy for adaptation measures.

Considering that the occurrence of extreme climate events in the future cannot be excluded, policies for both mitigation and adaptation should be viewed as contingency measures against such an eventuality; as such, they are advisable irrespective of the results of the cost-benefit analysis.

The present study is a starting point for more comprehensive and detailed research that could provide the backbone for a national strategy for addressing climate change. As such, it is by no means exhaustive and has its fair share of weaknesses and omissions, especially when it comes to the scope of the biophysical impact of climate change and the assessment of the economic impact disaggregated by sector. Further investigation would be needed to determine the advisability and the sequencing of, as well as the scope for adaptation measures in each individual sector. Other issues needing more thorough study are the impact of climate change on biodiversity and ecosystems in Greece and the indirect effects that changes in the ecosystems could, in turn, have on economic and social activities. Moreover, specific research is needed into the human health risks posed by higher temperatures, heat waves and the climate change-induced deterioration of living conditions in urban centres.

The present study does not examine issues related to the redistributive effects of climate change and of the mitigation and adaptation policies. The impact of climate change has social dimensions which deserve to be explored, especially as regards possible increases in poverty and migration, given that the effects of climate change and of policy responses to it will be most strongly felt by the lower-income population groups, which lack the necessary resources to address the problems caused by climate change and to finance measures for emission abatement and adaptation. Specific policies will be needed to avert the exclusion of any social groups from access to clean energy and technologies and to ensure adequate protection against damage from climate change.

Long-term energy planning is the core of climate change mitigation policy. The transition to an economy of low greenhouse gas emissions concerns all sectors of economic activity, consumption and energy production. Many aspects of this strategy, such as ways of removing the obstacles to energy conservation and to the diffusion of emission-free energy technologies, remain open to further exploration.

Further investigation is needed into the possible synergies between economic activity in Greece and the future markets for clean technologies in all sectors. Challenges for future study include energy pricing policy issues, market-based mechanisms that will support the diffusion of clean technologies, as well as restructuring policies designed to ensure that consumers and energy self-producers can participate in the energy market on a decentralised basis.

Future studies will have to look deeper into the fundamental strategic question of how dealing with climate change and reducing emissions can help boost growth in all sectors of the economy. This opportunity, if properly seized, could help reduce the costs of the mitigation and adaptation policies. New technologies, new activities, new standards for buildings and means of transportation, as well as the reorganisation of production activities need to become the focus of the new growth effort aiming at a low-emissions economy and protection against possible climate change-induced damage.

It is important, in further examining the impact of anthropogenic climate change, to take the sectoral studies deeper, by disaggregating their analysis by geographical area and focusing on the more vulnerable areas and the more vulnerable social groups. Pursuing this research in greater depth, enlarging its scope and disseminating its findings could all contribute decisively to creating a “critical mass” in society, which would, whenever necessary, push for proper policy decisions on climate change on the basis of long-term planning, and not in a myopic manner dictated by short-term political cost-benefit considerations, which would only multiply the burden on future generations.

The continuation of this project will provide both a challenge and an opportunity to improve the mathematical models of integrated assessment and to incorporate redistributive effects, uncertainty and non-linear modes of the ecosystems’ response to climate change.

There is still ample room for improving and expanding data and projections on climate and the atmosphere. Future simulations should be carried out in greater spatial detail, so that topography and the distribution of land and sea areas are more accurately factored in. The systematic updating of climate data and supporting the provision of timely information to the public about weather phenomena and their consequences is another area that needs developing. While being of help to the formulation of a strategy of adaptation to the anthropogenic component of climate change, these elements would also help shield Greece from the dangers posed by climate change. Climate change should also be “mainstreamed”, meaning that climate change strategies should be gradually integrated into all areas of policy, including foreign policy. Climate change cannot be addressed without the direct cooperation of all countries worldwide. Greece, as a member of the European Union, can and should play a role in mitigation strategy negotiations at the international level. The cost-effectiveness of Greece’s emission reductions will be higher if its energy market operates within a regional market, integrated as much as possible. Regional cooperation on climate change should therefore become a key axis of our country’s foreign policy, while another matter warranting particular attention is the strategy that Greece will adopt on the issue of emissions – on a global scale – from shipping.

At first glance, the current adverse economic conjuncture appears to constrain the financing of mitigation and adaptation policies. To the extent, however, that these policies can be exploited as an opportunity for new lines of economic activity and for growth, they can be part

of the strategy for the Greek economy's exit from the crisis and for setting up a new growth model – in other words, the adoption of mitigation and adaptation policies, rather than being hampered by the grave economic problem faced by Greece today, may actually contribute to its solution.