

## Climate Change Mitigation

The course was presented by Professor John Holdren, Professor of Environmental Policy and Director of the Science, Technology, and Public Policy Programme at Harvard University. Prof. Holdren warned that the disruption of global climate by human-caused greenhouse gases (GHG) in the atmosphere is the most dangerous and difficult of all the environmental problems caused by human activity. He stated that the main challenge of climate change is that its leading cause, the emission of carbon dioxide (CO<sub>2</sub>) from fossil fuel combustion, still makes up 80% of the energy system. He also stated that many people underestimate the serious risk of global warming: a small change in the index of the state of the climate corresponds to a large change on the surface of Earth. Prof. Holdren explained there is no quick-fix to climate change and stressed the importance of not delaying urgently needed actions to initiate the reduction of emissions.

According to Prof. Holdren, public opinion polls show that most people acknowledge we can no longer maintain a business-as-usual lifestyle. He presented two approaches to make the changes needed to address the climate change crisis: the first is mitigation, which means to reduce the pace and magnitude of the changes in global climate caused by human activities. Such measures could include reducing GHG emissions, enhancing sinks, geo-engineering; etc. the second approach is adaptation, which aims at reducing the adverse impacts of climate change on human well-being. Examples of adaptation measures include building dams and dikes, strengthening defense against climate-related diseases, etc. Between the two approaches adaptation tends to become more costly and less effective as the magnitude of climate change grows. The presentation thus focused on climate change mitigation measures.

In planning to undertake effective mitigation measures, it is important to keep in mind that the factors controlling CO<sub>2</sub> emissions are calculated on the basis of GDP per person, energy intensity of economic activity, carbon intensity of energy supply, and population. An appropriate mix of available technological measures (e.g. energy efficiency and renewable energy; carbon capture and sequestration (CCS), increased conversion of fossil fuels to end use energy forms, etc.) and policy measures (such as regulations; emission standards; incentives; taxes; research and development; etc.) is needed.

Prof. Holdren shared various technological options for reducing fossil CO<sub>2</sub> emissions, particularly related to energy intensity of economic activity and to carbon intensity of energy supply. He also discussed potentials and challenges of various renewable options, as well as options other than reducing CO<sub>2</sub> emissions. Prof. Holdren's policy recommendations were to: a) pursue a new global framework for mitigation and adaptation in the post-Kyoto period; b) to identify win-win technological and policy measures; c) to increase investments in energy technology innovations; and d) to expand international cooperation on energy technology innovations.