Thesis title : European Carbon Trajectories to 2050 under a 450 ppmv CO2-equivalent Stabilisation Scenario : Optimal Abatement, Carbon Value and Reduction Costs

Summary :

Global warming will be a major issue in the 21st century. Limiting temperature increase to +2°C above pre-industrial levels should help to preserve ecosystems. According to current estimates, this sustainable development objective requires a stabilisation of Greenhouse Gases (GHG) concentrations at 450 ppmv CO2-equivalent. Over the next decade, the world should reduce its GHG emissions by a factor 2 compared to 1990 levels.

Europe has committed to reduce its Greenhouse Gases emissions by 20% in 2020 compared to 1990 and by 30% in case of a fair international agreement. In the long term, EU is targeting an abatement of at least 80% by 2050, which is a required level under the 450 ppmv CO2-equivalent constraint. The thesis models carbon effort in Europe to reach -80% GHG by 2050. Over the projection, the OCTET model (Optimal Carbon Trajectories for Emission Targets) projects a set of temporally optimal CO2 pathways. Efficient reduction strategies are built for the next decades (2020, 2030, 2040) depending on international uncertainty. The thesis calculates carbon price profiles in Europe under a factor 5 reduction as well as reduction costs. In a word, this thesis seeks to explore the implications of a low-carbon European society and to advise the European abatement policy over the 2050 horizon.

Keywords : Global Warming, Sustainable Development, Europe, CO2 Abatement, Carbon Price, Reduction Cost, Environmental Modelling, Intertemporal Optimisation