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## Economic growth and projected effects of air pollution on human health over Europe

**Jonilda Kushta<sup>1</sup>**, Elias Giannakis<sup>2</sup>, Angelos Violaris<sup>1</sup>, Niki Paisi<sup>1</sup>, and Jos Lelieveld<sup>1,3</sup>

<sup>1</sup>Climate and Atmosphere Research Center, CARE-C, The Cyprus Institute, 2121, Nicosia, Cyprus (j.kushta@cyi.ac.cy)

<sup>2</sup>Department of Agricultural Economics and Rural Development, Agricultural University of Athens, 11855, Greece

<sup>3</sup>Max Planck Institute for Chemistry, Atmospheric Chemistry Department, 55128, Mainz, Germany

In this work we analyze the effects of inter-industry linkages on air pollution and human health associated with the expected growth of economic sectors towards 2030. A combined toolbox consisting of environmentally-extended input-output models, a regional atmospheric chemistry model (WRF-Chem) and a global exposure mortality model (GEMM) is deployed to conduct an economy-wide assessment of air pollution and attributable mortality in the European Union (EU). Preliminary evaluation of the atmospheric model reveals the significance of the accurate representation of residential combustion activities and carbonaceous aerosols, especially under a differential toxicity framework. Direct and indirect air pollution intensities of the economic sectors included in the study exhibit significant differences across EU countries. The highest pollutant intensity per unit of economic output, is created by shipping and reaches more than 20 tonnes/million Euro for NO<sub>x</sub>. This value is 4-5 times higher than the respective intensity for industry and power generation. However, industry and power generation lead to the largest (direct and indirect) increases in PM<sub>2.5</sub> concentrations in absolute terms. The most affected areas, in terms of surface PM<sub>2.5</sub> levels, influenced by substantial effects of the projected industrial growth, are found in Germany and northern Italy. While the greatest impacts of the energy sector's expansion will occur in central Europe, Finland, Estonia and major urban areas in southern Europe. Subsequently, the mortality burden of air pollution towards 2030 is primarily localized in the central and northern parts of Europe. These integrated analyses can help focus tailored mitigation efforts in sectors with significant (direct and indirect) emission intensities, rather than those with relatively low emission intensities and substantial economic contributions.