

# HEAT<sup>o</sup> SHIELD

## **Project Title: Integrated inter-sector framework to increase the thermal resilience of European workers in the context of global warming**

**WP2: Assessment of health and productivity consequences of current  
and future climatic scenarios**

**Deliverable 2.2: Vulnerability maps for health and productivity impact  
across Europe**

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## Abstract

Heat stress at the workplace constitutes a major problem for European workers with negative impact on the work performance causing productivity loss and equivalent reduction in European GDP. Since meteorological conditions vary across Europe, people working in different regions of the continent and in different occupational sectors have also different sensitivities and behavioral adaptations. State-of-the-art climate projections agree on a future increase of annual average temperatures over Europe, exacerbating the existing socio-economic imbalances. In this report we assessed the potential impact of climate change on productivity loss and the associated economic costs considering the geographic variability and the occupational diversity of Europe as well as future climate scenarios. Based on the assumption that European economy will remain relatively stable until 2050, the resulting maps estimate the impact of climate change on labor productivity and economic output across Europe. Heat stress in occupational settings will reduce the GVA of five strategic European industries (i.e. manufacturing, construction, transportation, tourism and agriculture) with a direct impact on the overall European growth, as the annual total economic loss will reach 11 billion Euros. The construction sector is expected to be influenced the most, facing an annual loss of about 4.7 billion Euros followed by transportation (2.8 billion Euros) and agriculture (2.4 billion Euros). Analyses based on the developed models showed that the countries of South Europe, especially the Mediterranean regions will experience the greater production loss with significant impact on their economy. More specifically, several regions of Cyprus, Greece, Italy, Portugal, France and Spain will undergo an annual loss of GVA between 51 million and 1 billion Euros. From a proportional viewpoint, Cyprus will experience the greatest percentage loss over all HEAT-SHIELD industry sectors of > 4% of the regional GVA. In addition, regions in Greece (Thessalia, Attiki and Ipeiros), Spain (Extremadura and Andalusia) and Italy (Calabria and Sicily) are projected to have losses of > 2% of their regional GVA. As these percentages may not seem significant to some, it may be worth adding the absolute annual loss which in Andalusia, for instance, will surpass 1 billion euro and in central and south Italy will reach 1.3 billion. A multi-sectoral approach that includes the setup of appropriate adaptation strategies should be implemented to address this serious environmental and socioeconomic challenge. It is hoped that the developed maps will become the basis for guiding adaptation measures at the European workplaces and will underpin future policies under the climate adaptation strategy.