

# NOTA DI LAVORO

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## **Quantifying the Ancillary Benefits of the Representative Concentration Pathways on Air Quality in Europe**

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# Climate Change and Sustainable Development

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## Quantifying the Ancillary Benefits of the Representative Concentration Pathways on Air Quality in Europe

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### Summary

This paper presents estimates of the economic benefit of air quality improvements in Europe that occur as a side effect of GHG emission reductions. We consider three climate policy scenarios that reach radiative forcing levels in 2100 of three Representative Concentration Pathways (RCPs). These targets are achieved by introducing a global uniform tax on all GHG emissions in the Integrated Assessment Model WITCH, assuming both full as well as limited technological flexibility. The resulting consumption patterns of fossil fuels are used to estimate the physical impacts and the economic benefits of pollution reductions on human health and on key assets by implementing the most advanced version of the ExternE methodology with its Impact Pathway Analysis. We find that the mitigation scenario compatible with  $+2^{\circ}\text{C}$  reduces total pollution costs in Europe by 76%. Discounted ancillary benefits are more than €2.5 trillion between 2015 and 2100. The monetary value of reduced pollution is equal to €22 per abated ton of CO<sub>2</sub> in Europe. Less strict climate policy scenarios generate overall smaller, but still considerable, local benefits (14 € or 18 € per abated ton of CO<sub>2</sub>). Without discounting, the ancillary benefits are in a range of €36 to €50 per ton of CO<sub>2</sub> abated. Cumulative ancillary benefits exceed the cumulative additional cost of electricity generation in Europe. Each European country alone would be better off if the mitigation policy was implemented, although the local benefits in absolute terms vary significantly across the countries. We can identify the relative losers and winners of ancillary benefits in Europe. In particular, we find that large European countries contribute to as much as they benefit from ancillary benefits. The scenarios with limited technology flexibility do deliver results that are similar to the full technology flexibility scenario.

**Keywords:** Ancillary benefits, External costs, Climate change mitigation, Integrated Assessment Models, ExternE, Impact Pathway Analysis

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The opinions expressed in this paper do not necessarily reflect the position of  
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