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Abstract: The use of modeling to support environmental authorities to plan air quality control policies is now quite widespread in Europe. At the sub-national level, the most common approach is based on a scenario analysis which uses Chemical Transport Models (CTM) to assess the impact of emission reductions on air pollution concentrations. In this work, a multi-objective approach based on RIAT+ (Regional Integrated Assessment Tool) is used to cost-efficiently define air quality improvement policies. Internal costs (due to the implementation of emission reduction measures) and external benefit gains (due to the reduction of population exposure to air pollution levels) are worked together. The optimization methodology was applied to the Porto urban area (Northern Portugal) where particulate matter (PM10) and nitrogen dioxide (NO2) levels exceed the legislated limit values. To estimate their concentrations, a single surrogate model was applied to the whole urban domain, allowing the implementation of a very efficient optimization procedure. This model was derived through a set of 10 simulations performed by a CTM fed with different emission reduction scenarios. The results indicate that to reduce both pollutants, control policies should be focused on the main activity sectors: non-industrial, road transport and other mobile sources. When the external costs of the control policies are compared with the internal benefit gains, for the RIAT+ optimal solutions, it is observed that external costs are always higher than the internal costs. This suggests that acting on emission control to reduce both pollutants is greatly beneficial from a socio-economic point of view.