# Environmental and health impact assessment of past technology incorporation in coal fuelled power plants: A global prospective using EDGAR-FASST model.

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During the past three decades, efforts were focussed on reducing greenhouse gas and air pollutant emission rates per GWh of generated power. This has led not only to fuel shifts but also to significant changes in the technologies employed for coal to electricity conversion - in terms of boiler and steam cycle design - and to the incorporation of NOx, SOx and particle removal processes.

The tool EDGAR (Emissions Database for Global Atmospheric Research) is a unique inventory database of greenhouse gas and air pollutant emissions from different economic sectors for every country from 1970 until 2017. For the energy sector, emissions are estimated based on power generation and fuel statistics – provided by IEA- and combustion and flue gas abatement processes. Emission trends can show the environmental co-benefits and trade-offs associated with the incorporation of given technologies. Emissions can also be used as input to impact assessment models such as FASST (Fast Scenario Screening Tool) to quantify air pollutant atmospheric concentrations and relate them with damage to human health and consequent economic losses. EDGAR estimates show that if the current coal based power production were supplied using 1990 matrix generation of technologies, total and sectorial NOx, SOX and PM 2.5 emissions would be significantly larger- highlighting the effectiveness of the deployment of more efficient energy conversion plant configurations and flue gas treatments in air pollution mitigation. The FASST model indicates that these modifications have increased life expectancy by up to 8 months in some regions of the world.

This work is intended to discuss how the proposed modelling tools can be employed for evaluating environmental and related human health impacts associated with technology incorporation - using country or world region greenhouse gas and air pollutant emission trends for coal power generation as case studies. It will also enable to understand which were the main drivers for the observed emission evolution and what would have been the consequences in term of environmental footprint and damage to human health and economy if the analysed energy conversion and flue gas treatment processes had not been implemented.