



“CLEANER PRODUCTION TOWARDS A SUSTAINABLE TRANSITION”

Early Stage Investment and Cost Calculation Methodologies for NO_x Reduction Measures in Large Combustion Plants

MAYER, C. ^{a*}, MUELLER, A.-K. ^a, FROEHLING, M. ^a, SCHULTMANN, F. ^a

a. Karlsruhe Institute of Technology, Karlsruhe

**Corresponding author, carmen.mayer@kit.edu*

Abstract

The worldwide energy demand, especially in terms of electricity, has been rising significantly over the last few years. Even though the total share of renewable energy supply is growing, the global amount of fossil energy is still not declining. To lower at least the environmental effects of fossil fuel burning, the demand for emission reduction measures, especially in combustion plants, is becoming more prominent, in industrial as well as in emerging countries. The various implemented technologies differ in many technical and economic parameters. Consequently, their suitability depends on the specific application.

A detailed estimation of investments and operating costs is an essential basis for plant operators in the early stages of an investment decision. Furthermore, policies may massively influence a national energy market and the depending industries by defining thresholds for emission levels and other technical parameters. In industrial countries detailed simulation models are used for this purpose on a micro- and macroeconomic level. In less developed regions, however, information on costs of large combustion plants and especially of emission reduction measures is scarce. Nevertheless, policy makers have a deep interest in methods for assessing possible effects of their decisions. The Task Force on Techno-Economic Issues (TFTEI, formerly known as EGTEI – Expert Group on Techno-Economic Issues), being part of the UNECE/CLRTAP (United Nations Economic Commission for Europe/ Convention on Long-Range Transboundary Air Pollution) has therefore been working on a problem oriented cost and investment estimation tool for fossil fueled large combustion plants for the last few years. Its goal is to support policy makers to implement reasonable environmental protection standards by evaluating the microeconomic effects thereof. But TFTEI is not the only group working on that issue, other methods are in use as well, like (amongst others) the one published by the US Environmental Protection Agency (EPA) in 2003. The aim of this paper is to compare the two methods and show the specific advantages and disadvantages for cost and investment calculation of secondary NO_x reduction measures.

The two methods shall be introduced in detail, followed by a quantitative and qualitative comparison of the calculation results with regard to the usability of each method in the given context. The TFTEI method is based on specific investments of established plants that can be adapted to the needs of the considered application. The EPA method consists of a more detailed technical description of the process, which is then translated into investments and costs components via empirically determined conversion factors. Subsequently, the strengths and weaknesses of the methodologies in the context of a cost calculation tool such as the one developed by TFTEI are discussed with a special focus on the characteristics and needs of the target group. The main outcome is that a calibration of the EPA method seems reasonable, as the calculation results are a lot lower than those of the TFTEI method, but within a steady proportion. Due to a lack of data, however, a calibration is not feasible at the current state. Further surveys are recommended to improve the data base and to reduce the uncertainty of the results.

Keywords: *Techno-economic assessment, Emission Reduction, Emerging Countries, SCR, SNCR*