Introduction. Selective catalytic reduction (SCR) with ammonia or urea is one of the most important industrial applications involved in NOx emissions reduction within power plants. The design optimization of such systems is complex and can take huge advantage in the usage of automatic open-source tools and HPC platforms.

Main Targets of the Project. A complete and automatic optimization workflow has been developed to face this kind of applications using only open-source tools. The workflow is meant to be able to autonomously evolve from a baseline plant CAD design to an improved one modifying the angle of the turning vanes (TV). The selected computational tools are: DAKOTA (optimization engine) and OpenFOAM (CFD RANS solver).

Discussion & Conclusion. The application presented herein shows how a more than 7% global improvement of fluid dynamics performance can be obtained using fully automatic CFD-driven shape optimization loop. This is considered a very promising results that could be eventually exploited introducing other CAD design parameters in the optimization process. Finally it is worthwhile notice that the workflow is built on top of an existing HPC platform using only open-source code and is therefore suitable to be exploited on more demanding CFD problems.