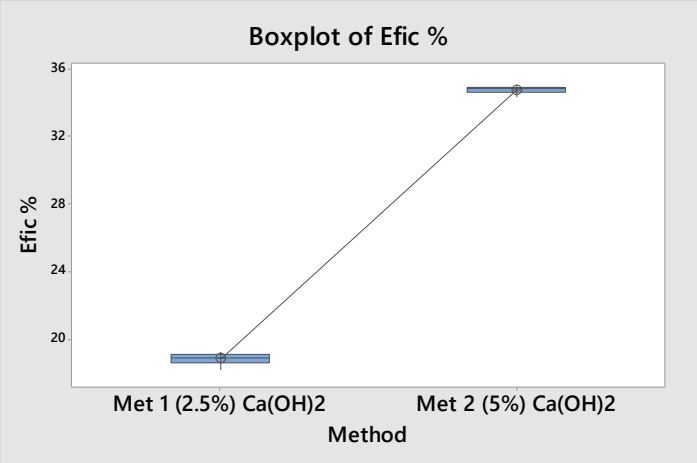
Six Sigma in energy production

Six Sigma is a data driven process improvement methodology based on **DMAIC** cycle (Define – Measure- Analyze – Improve – Control). This methodology can be applied successfully in energy industry. Examples of measurable indicators for the specific activity of transport can be: primary energy intensity, CO2 intensity, efficiency of the power plants, specific energy consumption, etc.

An example of a successful project using Six Sigma is "Reducing sulfur oxide emissions from burning coal in power plants ".

This project solved the problem of streamline of activities and reduce the negative influence of environment. The key indicator which give the performance of the process and choose to be improved is $\%SO_2$ from the flue gases ($\%SO_2$). In defining the problem, the process is identified and the team which will work on this project. Specific tools this phase (**D**efine) for this case can be: process map and collect voice of customer VOC.

Identification of factors which influence cash flow was done by Ishikawa, Cause Effect Diagram and 5 Why? These parameters are called potential causes. If we demonstrate with data the influence, potential causes can become root causes (**A**nalyze). Here, we can use more advanced techniques such as Hypothesis Testing. In our case, we used ANOVA (see picture below).



After finding the root causes, in our case the presence of sulfur in coal composition, we proceed to identify solutions that implemented would eliminate or diminish the negative effects for which it was made the project (**I**mprovement).

To find solutions you can use the following tools: Brainstorming, DOE (Design of Experiment), Regression. Choosing the most efficient, those who consumed the fewest resources or those that are implemented as quickly as possible can be done using Prioritization Diagram and Cause – Effect Matrix (Pugh). "Sulphur removal from the combustion gases, using as absorbent solutions the calcium hydroxide $Ca(OH)_2$" was the chosen solution.

The highest efficiency of combustion gases Sulphur removal was of the aqueous solution with sodium concentration of 5%, this being of 62.73%. Method is advantageous in economic terms also because the product resulted after Sulphur removal (gypsum) can be sold.

In Control, emissions were monitored and it was found an assigning in legal requirements.

We invite you to Six Sigma courses organized by Effective Flux to reap the benefits of this methodology.