Techno-economic study on advanced and conventional utility boiler start-up technologies

Background
The share of renewable energy sources in electricity generation is significantly increasing. Therefore, fossil fuel power plants need to work flexibly in order to secure the grid stability while covering the residual load of intermittent renewable sources. Flexible operation means, the plants need to work on part load and even be shut-down for specific period of time. The process of burner start-up and load increase are costly and time consuming procedures. There are several measures to increase the flexibility of solid fuel power plants, among them electrical ignition systems (EIS) have attracted special attention. EIS is used for ignition and stabilization of firing during the start-up and at part load operation of the plant, respectively.

Objective
The development of electrical ignition system for utility boiler start-up is an interesting measure to increase flexible operation of power plants. However, to mature this technology a comprehensive techno-economic study is essential. The technology should be compared with conventional methods, using expensive oil or natural gas for burner start-up. Considering several base case scenarios for a flexible power plant, the cost and increase efficiency of both methods need to be compared. The master thesis will be a cooperation between IFK Institute of University of Stuttgart and Mitsubishi Hitachi Power System Europe GmbH (MHPSE). The work will be performed in MHPSE office in Duisburg.

Approach and tasks
1. Literature review on flexibility of firing system in utility boilers
2. Development of a case study for startup and minimum load operation
3. Techno-economic evaluation of both conventional and advanced technologies

Requirements
- Basic knowledge in firing systems and utility boilers
- Good analytical skills
- Ability to work in a team
- Ability to work independently and goal-oriented

Start date: September/October
During the master thesis the student will be employed directly by MHPSE

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