

EFFICIENCY IMPROVEMENT BY IMPLEMENTING ENERGY AND OPERATION MANAGEMENT SYSTEM (NEMESYS)

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Abstract

One of main factors in increasing net plant heat rate at 3 x 350 MW Pelabuhan Ratu Coal Fired Power Plant is low boiler efficiency. It usually happens when the coal blending composition from various suppliers is incorrect, and improper ratio between air and fuel causing incomplete combustion inside the boiler. Therefore the boiler need an application to recommend well coal blending and proper combustion pattern according to the chemical properties of coal.

Energy and operation management system or NEMESYS is a Matlab based application. It runs with Artificial Intelligence (AI) and data analytical to identify the better composition of coal blending for effective combustion process (refers to ASME PTC 4.1.) according to fly ash and slag deposit formation; reliability and efficiency of boiler; and safety operation.

The Application starts by uploading spread excel daily that contains coal suppliers, coal properties including coal heating value, proximate and ultimate analysis, and also chemical analysis of coal ash for quantification of major oxides such as SiO₂, Al₂O₃, Fe₂O₃, CaO, MgO, Na₂O, K₂O. Further NEMESYS will process and determine which coal are suitable to blend and how to divide air and fuel flow for complete combustion. Effective coal yard mapping and operation also done to support this application for accuracy of coal data.

NEMESYS has been implementing since September 2017 until now. It give high profit through reducing coal consumption by increasing the boiler efficiency up to 1,24% per unit or decreasing the heat rate 1,56%. Total energy cost savings over 1 year by using this application is \$1.483.428,63 or equal to 0,0081 cents/kwh in reducing the generating main cost.