

ABSTRAK

Untuk mendukung kebijakan mengenai bauran energi terbarukan, Perusahaan Listrik Negara menerapkan program *co-firing* biomassa pada Pembangkit Listrik Tenaga Uap (PLTU). Program *co-firing* biomassa memberikan dampak secara langsung maupun tidak langsung. Pada tahun-tahun sebelumnya sudah dilakukan beberapa penelitian mengenai dampak *co-firing* biomassa terhadap boiler PLTU dalam rentang waktu tertentu dan dalam kondisi beban pembangkit *steady*. Belum diketahui seberapa besar pengaruh terhadap kinerja peralatan boiler PLTU, apabila *co-firing* biomassa dilakukan secara kontinyu dan pada kondisi beban pembangkit yang berbeda-beda. Penelitian ini bertujuan untuk mengetahui dampak *co-firing* biomassa yang dilakukan secara kontinyu terhadap kinerja peralatan boiler pada kondisi beban pembangkit yang berbeda-beda. Metode pengumpulan data dilakukan dengan metode observasi dan wawancara. Untuk analisis data menggunakan perhitungan dimulai dari menemukan nilai perhitungan *specific fuel consumption* dan *net plant heat rate* dilakukan secara manual menggunakan software microsoft excel, selanjutnya parameter operasi kinerja peralatan boiler dibandingkan dengan standard atau data *commissioning*. Selama proses *co-firing* berlangsung parameter kinerja peralatan boiler masih dalam batasan. Pada *medium speed mill* adanya penurunan arus motor pada dan penurunan *differential pressure*, selain itu tidak terjadi perubahan yang signifikan pada outlet temperature *medium speed mill* selama proses *co-firing* berlangsung. Ketika proses *co-firing* kinerja fan boiler (*Force Draft Fan*, *Primary Air Fan*, dan *Induced Draft Fan*) menjadi lebih ringan terlihat dari adanya penurunan arus motor dan penurunan pembukaan *control damper fan boiler*. Kinerja *air preheater* saat proses *co-firing* berlangsung arus motor stabil dan cenderung adanya penurunan temperatur baik sisi *inlet fluegas* maupun *outlet fluegas*. Adanya penurunan temperatur dalam ruang bakar selama *co-firing* sebesar 10-15°C. Dengan adanya *co-firing* rata-rata biaya produksi mengalami penurunan dari 485,324 Rp/Kwh menjadi 484,585 Rp/Kwh. Sedangkan nilai rata-rata *Net Plant Heat Rate* pada saat proses *co-firing* dilakukan selama penelitian mengalami penurunan dari 2862,85 kcal/kwh menjadi 2866,35 kcal/kwh. Selama penelitian berlangsung daya pembangkit bervariasi terdapat daya pembangkit maksimum pada tanggal 2,3,7,8,9,10 Juni 2022 (280 MW) dan daya pembangkit minimum pada tanggal 1,4,5, dan 6 Juni 2022 (<280 MW sesuai permintaan Area Pengatur Beban). Proses *co-firing* tetap berlangsung meskipun terjadi perubahan daya pembangkit baik maksimum maupun minimum. Untuk kinerja peralatan boiler masih dalam batasan operasi pada saat daya pembangkit maksimum maupun daya pembangkit minimum.

Kata Kunci : *co-firing*, *biomassa*, boiler, PLTU Batubara

**ANALYSIS OF THE EFFECT OF BIOMASS CO-FIRING
ON THE PERFORMANCE OF BOILER EQUIPMENT FOR COAL FIRED
THERMAL POWER PLANT**

ABSTRACT

To support policies related to the renewable energy mix, State Electricity Company has implemented a biomass co-firing program at power plants. The biomass co-firing program has a direct or indirect impact. In previous years, several studies have been carried out on the impact of biomass co-firing on power plant boilers for a certain time and the condition of the generator load is stable. It is not known how much it will affect the performance of boiler equipment, if the biomass co-firing is carried out continuously and at different generating load conditions. This study purpose to determine the impact of continuous biomass co-firing on the performance of boiler equipment at different generating load conditions. The method of data collection was carried out by observation and interview methods. For data analysis using calculations starting from finding the calculation value of specific fuel consumption and net plant heat rate is done manually using Microsoft Excel software, then the operating parameters of the boiler equipment performance are compared with standard or commissioning data. During the co-firing process, the performance parameters of the boiler equipment are still within limits. In Medium Speed Mill there is a decrease in motor current and a decrease in differential pressure, besides that there is no significant change in the Medium Speed Mill outlet temperature during the co-firing process. When the co-firing process the performance of boiler fans (Forced Draft Fan, Primary Air Fan, and Induced Draft Fan) becomes lighter, it can be seen from a decrease in motor current and a decrease in the opening of the boiler control damper fan. The performance of the air preheater during the co-firing process is stable and the motor current tends to decrease in temperature both on the flue gas inlet and flue gas outlet. There is a decrease in temperature in the combustion chamber during co-firing by 10-15°C. With co-firing, the average production cost decreased from 485.324 Rp/Kwh to 484.585 Rp/Kwh. Meanwhile, the average Net Plant Heat Rate (NPHR) during the co-firing process during the study decreased from 2862.85 kcal/kwh to 2866.35 kcal/kwh. During the research, the generating power varied, there was a maximum generating power on 2,3,7,8,9,10 June 2022 (280 MW) and a minimum generating power on 1,4,5, and 6 June 2022 (<280 MW according to Load Control Area request). The co-firing process continues despite changes in the maximum and minimum generating power. For the performance of boiler equipment, it is still within operating limits at the time of maximum and minimum generating power..

Keyword: co-firing, biomass, boiler, coal fired thermal power plant