

## Reburning Characteristics of Biomass Syngas in a Pilot Scale Heavy Oil Furnace

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**Abstract :** NO<sub>x</sub> reduction characteristics of syngas fuel were numerically investigated for the 2MW pilot scale heavy oil furnace of KITECH (Korea Institute of Industrial Technology). The secondary fuel and syngas was fed into the furnace with two purposes- partial replacement of main fuel and reburning of NO<sub>x</sub>. Some portion of syngas was fed into the flame zone to partially replace the heavy oil, while the other portion was fed into the furnace downstream to reduce NO<sub>x</sub> generation. The numerical prediction was verified by comparing it with the experimental results. Syngas of KITECH's experiment, assumed to be produced from biomass, had very low calorific value and contained 3% hydrocarbon. This study investigated the precise behavior of NO<sub>x</sub> generation and NO<sub>x</sub> reduction as well as thermo-fluidic characteristics inside the furnace, which was unavailable with experiment. In addition to 3% hydrocarbon syngas, 5%, and 7% hydrocarbon syngas were numerically tested as reburning fuels to analyze the effect of hydrocarbon proportion to NO<sub>x</sub> reduction. The prediction showed that the 3% hydrocarbon syngas is as much effective as 7% hydrocarbon syngas in reducing NO<sub>x</sub>.

**Keywords :** syngas, reburning, heavy oil, furnace

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