Combustion behaviour of raw and pelletized wood at suspension-fired conditions

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Denmark's largest energy company, Ørsted, recently revealed to convert all its fossil fuel-fired combined and heat power (CHP) stations to operate completely on biomass by 2023. Retrofitting the power plants from coal to sustainable biomass by utilizing existing milling equipment and auxiliary infrastructure offers a cost-efficient and practical option at low capital investment to mitigate industrial greenhouse gas emissions. An important part of the green transition of the existing Danish CHP plants will play wood pellets from sustainable forestry [1]. Wood can be classified as either hardwood or softwood due to its different physical structure. The type of wood affects the pelletization and thermal conversion process. To facilitate the conversion from coal to wood pellets in existing power plants, an understanding of the combustion properties of the milled wood pellets at suspension-fired conditions is desirable. The objective of this study was to investigate the effect of raw and pelletized wood under suspension-fired conditions. The combustion behavior of pine (a softwood) and beech (a hardwood) in a single particle combustion reactor (see Figure 1) was studied. Recent results suggest that the apparent density of wood has an essential influence on the prediction of devolatilization times and charcoal burnout times. Pine particles were easier to pelletize and formed higher densities than beech pellets.

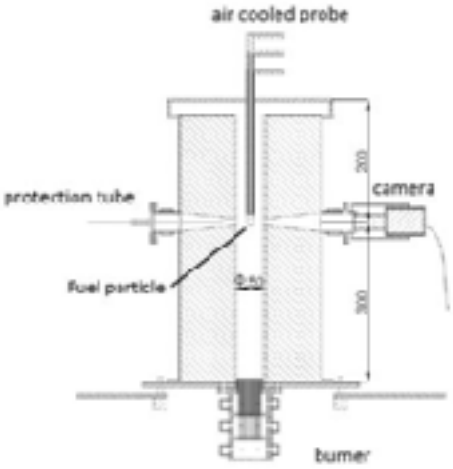

Fig.1 – Single particle reactor operated at suspension-fired conditions.

References

[1] J. Obling, Dong Energy's biomass conversion status and plan for coal phase out in 2023, Keynote Presentation at the Nordic Flame Days in Stockholm, Sweden, (2017).