Opportunities and Challenges for Co-firing Challenging Biomass with Coal for the UK Low-Carbon Energy Transition

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Abstract for oral presentation

Biomass co-firing could contribute to a cost-effective transition option towards a secure low-carbon energy economy. Policy incentives or mandatory regulations have already been implemented worldwide to increase renewable share in the electricity sector, including biomass co-firing [1]. If biomass is to make a meaningful contribution to the energy mix, estimates of the biomass resource potential and its sustained and sustainable use are essential to underpin many strategic investment and policy decisions that must be made [2]. In this context, the inclusion of challenging fuels (i.e. waste wood arising from municipal, commercial, industrial, construction, and demolition waste streams) into the fuel mix, which would otherwise constitute a disposal challenge, would make the electricity generation mix more diversified and secure.

Power plants using challenging fuels could accelerate the pace of the UK's low-carbon energy transition, but appropriate financial support from governmental schemes will likely be needed to create de-risked revenue streams for investors and enable sufficient capacity to be added to the UK electricity system. This is due to the fact that these plants are typically not attractive to investors because of potential low efficiencies and low load factors associated with fuel diversity and operating issues (e.g. fouling, scavenging and corrosion) that arise during fuel combustion. Policies to incentivise these plants would reduce waste wood dumping to landfill and support waste wood energy recovery and perhaps also plant flexibility [3].

This study provides an insight into the current status of biomass use in the UK energy sector, including an overview of the existing and future planned power plants for biomass co-firing and full conversion. It also investigates opportunities and challenges associated with integration of challenging fuels into the fuel mix for the future UK electricity system. Using a unit commitment model under different policy schemes, this study evaluates the overall system cost associated with operating plants and the cost-effectiveness of optimal scheduling of the plants that use challenging fuels. The final objective of this work is to make recommendations on future deployment opportunities for challenging biomass under uncertain electricity market and regulatory arrangements.

Keywords: challenging fuel, co-firing, efficiency, flexibility, incentives, unit commitment

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