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ALTERNATIVE FUELS VIA REGULATED ACTIVATED  
CARBON INJECTION AND FLUEGAS RECIRCULATION

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**CONTROL OF DIOXIN EMISSIONS FROM ALTERNATIVE FUELS  
VIA REGULATED ACTIVATED CARBON INJECTION AND FLUEGAS RECIRCULATION**

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Highlights

- Alternative fuels contain hazardous pollutants and precursors (dioxins, halogens).
- Compliance by conventional AC injection not ensured under high precursor variability.
- Regulated AC injection ensures compliance and non-increasing emission rates.
- Fluegas recirculation reduces dioxin/metal emissions by increasing APCS efficiency.

**ABSTRACT**

Energy from renewable sources and alternative fuels (AFs) including biomass and refuse or waste derived fuels is spreading worldwide towards resource recovery and sustainability. Hazardous emissions including persisting organic and inorganic pollutants (PPs) such as dioxins/furans and metals are of high concern due to bioaccumulation and toxic effects. Compliance achieved by excessive overdesign of air pollution control systems (APCS) or process retrofitting with halogen and metal bypass systems, carries along substantial costs. It is shown that (a) traditional injection of activated carbon prior to the APCS based solely on fluegas flowrate may not ensure PP compliance under high precursor variability (e.g., PVC plastic, metals in AFs), while at low precursor rates it leads to excessive activated carbon consumption and PP contaminated flyash, (b) a cost-effective system with feedforward regulated AC injection ensures compliance under high AF precursor variability and averts AC overdosing, (c) An activated carbon injection regulation that guarantees both compliance and reduced emission rates is proposed, (d) Fluegas recirculation offers additional advantages towards more efficient abatement of hazardous PPs, by reducing the overall offgas flowrate and increasing the APCS residence time and removal

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