IEA Bioenergy

Co-firing for power and heat production allows the replacement of fossil fuels with biomass at existing large-scale power plants, thus benefiting from high efficiency through economies of scale while reducing significantly CO_2 emissions with relatively low additional capital investment. Indirect co-firing concept integrates biomass gasification in the process.

INDIRECT CO-FIRING

Indirect co-firing consists of the combustion of producer gas from biomass/waste gasification in coal-fired furnaces or lime kilns. Gasification can be thus considered a method for biomass pre-processing.

Advantages

- High efficiency (economy of scale).
- Use of existing infrastructure.
- Relatively low additional capital investment.
- Reduction of CO_2 emissions.
- Fuel flexibility.
- **Possibility of keeping biomass ash separated from coal ash.**
- High co-firing ratios possible.
- No significant impact on the performance of boiler (capacity, stability and availability).
- **Less strict requirements in producer gas quality** (heating value, tar and particles content) as compared to other applications (e.g.gas turbines, engines).
- Better fuel flexibility than direct co-firing.

Disadvantages/ challenges

- Relatively high unit investment costs compared to direct co-firing (investment costs:300-1100 €/kW_e).
- Risk of fouling and hot corrosion due to Cl, S and alkalis (but lower compared to direct co-firing).

Examples of commercial indirect co-firing plants

Plant	Biomass fuel	Type of gasifier	Producer gas cleaning
Amergas power plant, Geertruidenberg, The Netherlands	Waste wood (5% of total heat input to boiler)	Air-blown CFB, 83 MW_{th}, 840°C	Cooler + cyclone
Kymijärvi power plant, Lahti, Finland	Recycled energy fuel (REF), sawdust, bark, wood chips, wood wastes (15% of total boiler input fuel)	Air-blown CFB, 45-70 MW_{th} 850-900°C	-
Metso Vaskiluodon Voima, Vaasa, Finland	Forest residues (chips)	CFB, 140 MW_{th}	-
Electrabel Ruien power plant, Belgium	Wood chips, bark, hard and soft board residues	Atmospheric, air-blown CFB, 40-80 MW_{th}	-

Metso Vaskiluodon Voima, Finland (top). Amergas, The Netherlands (bottom).