

ThermalNet

Technology Strategies and Policy

Combustion

Combustion	
Characteristics (status)	Widely commercial available
Products	Electricity & Heat
Opportunities and barriers	Large scale and short term deployment of bio-energy, permits, long term policy commitments
Markets	From small scale domestic heat (kW) to large scale power plants (0.5 GW)
RD&D needs	Aerosol emissions for small scale, fuel flexibility for large scale & higher biomass % for co-firing
Costs	4 to 12 €/kWh for short term CHP from agriculture and forestry biomass
Conclusions	Co-firing is the best option for short term large scale bio-energy production
Recommendations	Expansion from clean forestry and agro residues to more complex biomass fuels requires more stable investment climate

Gasification

Characteristics (status)	Main fundamentals of gasification technology are well understood, today. A lot of industrial experience is available
Products	Wide range of products - Heat, Electricity, Fuels, Chemicals.
Opportunities and barriers	<p><u>Opportunities:</u></p> <ul style="list-style-type: none"> •Wide range of possible products •High efficiency •Important part of biorefineries based on syngas <p><u>Barriers:</u></p> <ul style="list-style-type: none"> •Economics •Too many negative examples •Too long time for commercial break through
Markets	Not yet clear (polygeneration, electricity, biofuels, chemicals)
RD&D needs	Plant optimization; Fluidized bed gasification; Gas cleaning (high temperature); Fuel pre-treatments; Economic aspects; Product upgrading
Costs	<p>Electricity: 0,1 – 0,2 Euro/kWh (30 – 60 Euro/MWh)</p> <p>BioSNG: 0,6 – 0,8 Euro/Nm³ (16 – 22 Euro/MWh)</p> <p>BioFiT: 0,5 – 1,0 Euro/lit (15 – 30 Euro/MWh)</p>

Pyrolysis

Characteristics (status)	Dynamotive 100 and 200 t/d plants + plans BTG has 50 t/d unit in Malaysia. Pytec & Biomass Engineering has 6 t/day unit
Products	<u>Liquid</u> Stability has improved, acidity, viscosity, solid <u>Char</u> Use in process or export
Opportunities and barriers	<u>Opportunities</u> Heat & power; Energy carrier; Upgrading; Biorefineries <u>Barriers</u> Maximum size, Feed quality, Heat transfer reactor
Markets	Heat, Power, Energy carrier, Biofuels, Chemicals,
RD&D needs	Feed preparation and quality and multiple feeds Heat transfer to reactor Liquid quality and norms and standards; Multi-functional reactors Scale up and Cost reduction
Costs	50 t/d plants costs around 8 m euros total cost
Conclusions	Offers decoupling and decentralised operations Liquid quality important Heat transfer to the reactor important