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Fuel gas by thermal gasification: Principles, potential and policy

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Thermal gasification can convert biomass to carbon neutral, or even carbon negative fuel gases, much more quickly and efficiently than anaerobic digestion. Applications include off-grid electricity generation, supply to the gas grid, and improved cooking stoves. Such stoves use far less fuel and are far healthier than cooking over a three stone fire. Fuel can be agricultural waste instead of wood from forests. Biochar can be produced as a by product and used to restore soils depleted of carbon. There has been huge take up in China. Take up of such \$10 stoves in Uganda is increasing from a low base at 50% p.a. The principles of operation are similar to larger gasifiers. Instead of cooking, this pyrolysis gas can be used to generate electricity for a minigrid to provide lighting, phone charging and television after sunset. Other uses include pumping water or grinding corn in rural villages. The gas has to be cleaned to prevent contamination from tar causing frequent servicing. These gasifiers are best established in India but also used in Europe where there is waste woody biomass. They range up to about 500kW electrical capacity. Engineers with experience of coal gasification propose biomass gasifiers that operate under pressure and use oxygen instead of air delivering over 50 MW (gas) to feed into the neighbouring gas grid. The pyrolysis stage described above is integrated with a higher temperature 'steam reforming stage' producing 'syngas' which is then converted into hydrogen or methane. Overall efficiencies of over 80% are forecast (hydrogen). It is estimated that in this way UK biomass could satisfy 33% of current energy needs, but as for renewable electricity, incentives are needed. These in turn require a wider appreciation of the importance of 'green' fuel gas.



Biography

Bill Powell a retired chartered engineer convinced of the potential of biomass to supply huge quantities of fuel gas and provide a very substantial contribution to the energy needs of the United Kingdom. He have advised both Chris Huhne and Ed Davey who served as energy ministers in the coalition government. He have addressed several conferences such as the World Hydrogen Technology Convention (WHTC) 2011 in Glasgow, and several specialist conferences such as those hosted by the IET. He cooperate with H2-Patent in Germany.

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