## 5<sup>th</sup> World Bioenergy Congress and Expo

June 29-30, 2017 Madrid, Spain

## Guide to best practices for specifying and operating small scale biomass gasification power projects in developing countries

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The biomass gasifier is a relatively inexpensive alternative to diesel and gasoline generation of electricity, for small scale off-grid L and distributed generation; particularly in developing countries facing high fuel prices, but they have ample sustainable biomass resources. This guide book provides the best practices to owners who have recently installed or are anticipating installing biomass gasification power projects to ensure success. The guide book recommends best practices for specifying and operating small scale biomass gasification power projects. The best practices will accelerate the market penetration of small-scale biomass gasification systems (< 1 MW power) by assisting operators and end-users/investors in planning, assessing the potential risks and imposing realistic measures and operating the projects. The best practices are developed using the knowledge acquired through experience and research and also based on the recommendations of original equipment manufacturers and current industry practices. This guide also provides an overview of typical biomass gasification power projects and components, experience so far, lessons learned and guidance for installation, operation, troubleshooting, preventive maintenance, repair and replacement, training, and safety. This guide book should be used in conjunction with site-specific and equipment-specific guidance provided by design organizations and equipment manufacturers. Biomass gasification converts solid carbon fuels/ wastes (such as rice husk, wood chips, stalks, animal manure, domestic garbage, sewage, etc.) into combustible gases, called syn gas or producer gas, by a process of partial combustion. The syn gas, after the processes of dust/tar removal, dewatering and cooling is sent into gas engine to drive generators. It is fairly simple to produce combustible gases from wood; the real challenge is to provide a syn gas that is conditioned for use in gas turbines or reciprocating engines. Along with the syn gas, the gasifier will also produce waste water, solid ash, soot, and tars depending on the technology used.

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## The future of bioenergy in Turkey

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reen energy or green power is the generation of electricity from sources such as biomass, wind, solar, geothermal, hydraulic and J sea energies that do not have harmful effects to the environment. Green energy sources have sustainable and secure characteristics beneficial to nature and economy. The interests in renewable energy sources increase steadily all over the world, since they are an alternative to fossil fuels. Turkey has rich renewable energy sources. The potentials of the main renewable energy sources of Turkey are 6015 TWh/year solar, 290 TWh/year wind, 216 TWh/year hydro, 197 TWh/year biomass and 35 TWh/year geothermal energy. Turkey aims at further increasing its use of hydro, wind, solar and biomass energy resources and Turkey has potential producing 30% of its electricity need from the renewables by 2023. Biomass is expected to play a crucial role in Turkey. Biomass is the major source of energy in rural Turkey. Biomass is used to meet a variety of energy needs, including generating electricity, heating homes, fueling vehicles and providing process heat for industrial facilities. Biomass potential includes wood, animal and plant wastes. Among the biomass energy sources, fuelwood seems to be the most interesting because its share of the total energy production of Turkey is high at 21%. The total biomass energy potential of Turkey is about 117 million tons and 32 Mtoe. The amount of usable biomass potential of Turkey is approximately 17 Mtoe. The electrical production from usable biomass has a net impact of 4.4 billion USD in personal and corporate income and represents more than 160,000 jobs. The first combined heat and power plant is using annually 60.000 ton wood and wood bark and producing 28 MWheat and 6 MWelectricity since 2008 at Caycuma Paper Factory in Turkey. Eight power plants are producing nearly 85 MW heat by using forest and agricultural wastes in a year. Pellet production plants are producing nearly 200.000 ton pellet in a year. Pellet production from wood- and agricultural wastes will play an important environmental role in Turkey too.

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