

China's pellet market is expanding, spurred by low-cost production

Pellet power

lmland of the modern skylines, suits and subways of Beijing and Shanghai lies China's central province of Henan. Here the economic focus is on agriculture, as Henan produces the nation's leading output of wheat and sesame – as well as its second largest rice output – and has earned the province its reputation as China's breadbasket.

Biomass pellet production in China

The biomass pellet industry of China and the rest of the developing world are beholden to the example set by western regions, particularly Europe. It is here, in the wake of the late 1970s oil crisis, that the movement towards biomass energy began in earnest. The first large-scale biomass power generation project was launched in Sweden in the early 1980s. Its success then spawned similar projects throughout Europe, North America and, eventually, to the developing world.

Key to the success of biomass in the developing world is the ability to convert agricultural waste into fuel. A far greater proportion of incomes in the developing world are spent on food than elsewhere and countries with large populations, such as India and China, must dedicate a substantial share of their land toward agriculture. To be successful, biomass energy production must compliment rather than compete with this economic situation.

In China this has meant the development of rice, wheat and corn husks for use as biomass energy rather than preferred wood resources. Such challenges have delayed the industry's development in

the country, but as is typical of China, it has recently caught on and expanded rapidly. In 2007 there were only 25 large-scale biomass plants in the country with less than 1GW of installed capacity. Now ground is broken on a similar number of projects each year, and installed capacity has risen to 3.2GW. By 2020 this is planned to reach 30GW.

Using agricultural residues to meet such goals will mean overcoming challenges associated with raw materials. The greatest such challenge occurs upon combustion, and relates to the generation of ash and the degradation of boilers. The practice of fertilisation, commonly utilised in agriculture while less so in forestry, imparts higher levels of elements such as potassium, chlorine, sodium and sulphur. Special boilers and increased maintenance are needed to compensate for these drawbacks. Another challenge occurs in transport, as less dense materials such as straw require more or larger shipments to produce the same weight in pellets as with wood. Furthermore, agricultural materials more rapidly wear the mill's essential components – namely the die.

Yet such concerns are only secondary to the underlying question: Why use pellets at all? Other materials such as briquettes, woodchips or even logs are cheaper and require less extensive processing. The reasons are several. The first is the moisture content. Even in seasoned wood the moisture content tends to be around 30%; compare this with less than 10% for wood pellets. This results in significantly less smoke from burning pellets. Second, pellets produce less ash since contaminants such as soil and bark, found

in woodchips, is removed during the pellet production process. The third, most important reason is energy density, which is more than three times greater in wood pellets than in woodchips, and even greater than similarly compact briquettes. This greatly reduces storage and stove-volume requirements. It also makes it a more viable substitute for coal.

Pellet production in practise

Anyang General International (AGICO), based in Henan, seeks to make biomass pellets a feasible energy solution for a wider range of consumers worldwide. It does so with a two-pronged approach based on the small and large mill competencies of the two different manufacturing facilities within AGICO. The advantages of the group begin, as with all complete pellet production lines, at the initial size reduction phase with the hammer mill. The Gemco facility has developed a special hammer mill that combines the functions of a chipper and pulveriser, thereby increasing efficiency by 30% over traditional models. The machine can handle incoming biomass with diameters of up to 200mm. The AKG plant builds upon this technology for its own hammer mill with a higher rate of output necessary for large-scale production.

After processing at these machines, the feedstock is then ready for the essence of the pellet process: the pellet mill. This apparatus breaks down to a set of two rollers, turned by the force of a diesel engine or electric motor, that pushes the raw material through holes in a metal disk – the die. These pieces

are the most expensive and experience the greatest wear. For this reason, AGICO-made dies, rollers and other moving parts are made of steel alloyed with chromium, manganese and titanium, and are heat treated for durability. As a result, dies last three to five times longer. An additional cost-saving measure with AGICO's small, flat-die pellet mills is that the dies are reversible, thereby further extending its usable life. The interior of the die holes are polished to eliminate tramp metal to prevent blockage, breaks and fines. In all mills corrugated rollers are utilised – modified, close-ended ones in the large-sized AKG ring die pellet mills – which are superior in the prevention of slippage.

Other features of AGICO's machinery include thick cast iron for parts which must endure the high pressures required for biomass pellets. Gemco's smaller mills employ specially crafted gears to transfer force perpendicularly from the motor, the ratio of which is considered proprietary information. The large pellet mills of AKG are equipped with devices to sequester VOCs emitted during the raw material drying process. Similar units are employed for dust collection, as are reinforced seals, to ensure worker safety. With the international market in mind, AGICO's machinery has obtained CE and ISO certification.

The company is able to produce 2.5 tonnes of pellets an hour at a single mill. This pellet production is often transported to cogeneration plants, as well as to companies abroad. ●

For more information:

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