

Bioenergy from sugarcane: new perspectives for Southern African developing countries

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The high efficiency of sugarcane as solar energy converter is well known, allowing to implement competitive and sustainable production of ethanol as automotive fuel and bioelectricity in several countries. In recent times the potential of sugarcane as bioenergy carrier has been considered for more countries, including wet tropical regions of Southern Africa, generally proposing to replicate the Latin America mature and well succeeded experiences. Nevertheless, although there are many relevant similarities between those developing countries, some particularly important features in each country impose innovative approaches that take into account the characteristics of feedstock production, output profile, marketing conditions and available logistics infrastructure, as summarized in Table 1.

Table 1. Differences between sugarcane bioenergy systems in mature contexts and new frontiers

| Feature | Mature contexts | New frontiers |
|------------------------------------|---|---|
| Feedstock production | Consolidated, involving mostly plantation schemes centrally managed, applying modern technologies, such as biotechnology based sugarcane breeding, precision agriculture and mechanized harvesting. | To be implanted, generally involving land tenure issues and possibly demanding multiple small producers, applying appropriate technologies, which mean in some cases traditional and conventional agricultural practices. |
| Output profile | Focused essentially in ethanol as vehicular fuel and sugar aiming at domestic and international markets, as well as bioelectricity from ligno-cellulosic by-products. Increased interest in the biorefinery concept and most complex processes. | Multiproduct and flexible, adopting conventional, but reliable and well known processes targeting the production of sugar, bioethanol for automotive and other uses (such as cooking and small scale power generation), power from cogen plants in mills, bagasse pellets as a substitute to traditional firewood consumption, etc. |
| Bioenergy marketing conditions | Developed and some cases consolidated | To be implemented |
| Available logistics infrastructure | Adequate | Mostly to be implemented |

Under these conditions, and particularly for developing countries in Southern African, greenfield bioenergy systems need an appropriate design, possibly adopting different scales, routes and technical solutions, establishing new paradigms, where production efficiency and yields should be considered in a broader and integrated perspective. In this paper the basic elements of this new path for developing sugarcane based bioenergy systems are commented, preserving the main features of already proved solutions, but adapting technologies and incorporating novel strategies. The adoption of small distilleries is discussed, presenting their advantages and constraints, as well as estimating their potential for supplying power to the public grid and providing fuels for cooking. In some contexts such innovative approach can be a first and firm step towards larger systems that envisage domestic and international markets.

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