Comparative Assessment of Modern Bioenergy Potential in Thailand & Kenya

Akom, Emmanuel

Publication date: 2015

Introduction:
Globally, 2.7 billion people rely on traditional biomass for their basic household energy needs (Fig. 1). This is especially the case in South Saharan Africa (SSA) and developing Asia. This paper is a comparative study on Thailand and Kenya (both are GNESD member centre countries).

Key drivers for the increased modern bioenergy interests in Thailand and Kenya include:
- diversification of energy resources;
- reducing national energy imports;
- rural income generation; and
- reduction in greenhouse gas (GHG) emissions.

Both Thailand and Kenya are agricultural economies. Thailand is a major exporter of food such as rice, sugar, corn and palm oil, globally. Kenya on the other hand exports tea, coffee and horticultural produce. Debate on the use of food sources for energy generation is still on-going. The utilization therefore of sustainably extracted agricultural residues could play in achieving national demand for electricity in both Thailand and Kenya.

Objective:
The objective of this study was to understand the role that sustainably extracted agricultural residues could play in achieving national demand for electricity in both Thailand and Kenya.

Method:
Using methods developed by FAO and IEA, this paper estimated per annum residue amounts from Thailand and Kenya's agricultural production. This study applied sustainable extraction of agricultural residues should be extracted from each soil type as this is geographic and soil/location specific. Studies would be required to determine the exact extent to which both Thailand and Kenya. In practice however, ddapho-climatic extraction would be considered for bioelectricity generation in both Thailand and Kenya.

Results and Discussions:
There appear to be more agricultural production and hence residue generation in Thailand compared to Kenya (Tables 1 & 2).

Due to competing utilization of agricultural residues for animal fodder, bedding, soil nutrient replenishment and other energy applications, only 20% of available residues (sustainable extraction) would be considered for bioelectricity generation in both Thailand and Kenya. In practice however, ddapho-climatic studies would be required to determine the exact extent to which agricultural residues should be extracted from each soil type as this is geographic and soil/location specific.

For Kenya however, the residues could provide between 0.8 - 2.2 TWh/year (Table 2). These are significantly smaller compared to Thailand.

Results and Discussions (contd.):
For Kenya however, the residues could provide between 0.8 - 2.2 TWh/year (Table 2). These are significantly smaller compared to Thailand.

However, the amount of bioelectricity generation from Kenya's residues could potentially satisfy the country's electricity demand to a far greater extent compared to Thailand. For example, up to a third of Kenya's electricity demand of 6.32 TWh/year can be met from agricultural residues alone (Fig. 2).

Whereas, bioelectrification from sustainability derived residues in Thailand, would only satisfy up to 11% of the country's 155 TWh electricity demand per year.

Conclusion:
- Bioelectrification from agricultural residues presents an opportunity in the food-energy nexus and help address issues pertaining to food (in)security and modern energy provision especially to rural communities in Asia and Africa.
- Bioelectrification from residues hold good potential for both Thailand and Kenya, however it seems to have greater potential impact in Kenya compared to Thailand.
- Wider uptake in bioelectrification would require additional investments in research, demonstration and deployment.

Acknowledgement:
Special thanks to the Global Network on Energy for Sustainable Development (GNESD) for supporting this research.