

COMMENTARY

Converting waste to power in the developing world

The US' Emergence Bioenergy wants to help farmers in developing countries by turning their waste into an economic opportunity

By Timothy Spence

- The company plans to focus on Bangladesh before expanding
- Plans for expansion include South Asia in 2012 and sub-Saharan Africa later
- Emergence Bioenergy's technology is considered relatively environmentally benign

During the Great Depression, the US' New Deal reformers believed that national revival could not be achieved unless farms and impoverished rural areas were given Twentieth Century energy.

The resulting electrification programme brought light bulbs to 1.5 million farms within two years. But more importantly, energy meant farm mechanisation and refrigeration for milk and other perishable goods, setting the stage for a revolution in agriculture that would feed the post-war baby boom.

Renewable energy offers the opportunity to do the same thing – on a far larger scale – in developing countries, where the cost of providing electricity to the countryside is beyond the means of most poor nations.

From humble beginnings

While bioenergy is typically talked about on a grand scale – turning cropland into the oilfields of tomorrow – it may be more achievable to start out small.

One US-based company, Emergence Bioenergy, is launching an effort to do just that. It wants to sell technology to farmers in the developing world that will convert animal dung and other agricultural waste products into energy, providing power for refrigeration and the potential to mechanise dairies, energise homes and perhaps even supply community grids.

“South Asia and sub-Saharan Africa are relatively unique in the sense that

centralised grid infrastructure really doesn't serve the vast majority of people,” Firas Ahmad, director of the Cambridge, Massachusetts-based company, told the World Biofuels Markets conference held on March 22-24 in Rotterdam.

“It just doesn't make any economic sense to expand the grid to these billions of people, because the cost of the infrastructure is too high ... so the question is how do you then [provide] infrastructure that itself makes economic sense to expand access.”

Emergence Bioenergy's answer is to provide the technology to generate electricity using combined heat and power (CHP) technology. The company is starting out by selling micro-CHP units, smaller than a household refrigerator, to dairy farmers in Bangladesh, a nation where 60% of the population, or 95.7 million people, lack electricity. Experts estimate that up to 40% of milk produced in the country is spoiled before it reaches markets because of sparse or unreliable refrigeration.

Micro-CHP technology is widely available and is already being adopted for household and industrial co-generation in wealthier countries. Yet its greatest potential could be in developing nations, where public energy supplies either do not exist or are not reliable.

Increasing value

Skyrocketing petroleum prices and the high cost of building power infrastructure

mean that the expansion of electricity to rural areas remains a distant dream, despite commitments through the UN Millennium Development Goals and other poverty-fighting initiatives.

Energy poverty is most glaring in sub-Saharan Africa, with a rural electrification rate of 14.3%, followed by South Asia, at 51.2%, according to the International Energy Agency (IEA). By comparison, the overall rate is 99.5% in the 34 member states of the Organisation for Economic Co-operation and Development (OECD). In developing nations, more than 500 million households depend on traditional biomass for cooking and heating, according to the UN Environment Programme (UNEP)

Ahmad told *REM* in an interview that his vision was to build from the ground up, creating “an entrepreneur-driven process of rural electrification. It's a fundamental concept, to take what's there and get more value out of it.”

The power-generating technology costs upwards of US\$8,000 per unit, Ahmad says, about the price of eight cows in rural Bangladesh. The company will work with non-government organisations to provide start-up financing.

Emergence Bioenergy plans to focus on Bangladesh before expanding to other South Asian nations in 2012, and later sub-Saharan Africa. It was in Bangladesh where the firm's founder, Iqbal Z Quadir, spearheaded efforts to provide mobile phones to the rural poor in the 1990s. ►►

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Quadir is director of the Legatum Centre for Development and Entrepreneurship at the Massachusetts Institute of Technology.

Advantages of being small

The technology being used by Emergence Bioenergy has a number of advantages, advocates say, starting with being relatively environmentally benign.

By recycling waste, micro-CHP skirts the concerns that the ethanol and biodiesel industries are undermining food production. It requires little transportation, and can replace or cut dependence on foul-smelling diesel generators that are costly to operate. Micro-CHP is also cheaper than comparable solar and wind equipment, and easier to transport to remote areas.

A UNEP report, "Assessing Biofuels," identifies the potential for the energy technology. "As stationary use of biofuels for heat, power and CHP is generally more resource-productive than for transport, policies may be devoted to

preferential support for the former," the 2009 report says.

Small-scale projects also have another advantage: easier financing. Because bioenergy carries inherent risks – failed crops, drought and agricultural price volatility among them – bankers and donors take their time before investing in grand projects.

The US in the early twentieth century had a similar experience. The cost of providing electricity to rural communities was too high for private investors, and efforts to tap state funding collapsed as the Depression took its toll. Washington's support was inevitable, leading to the creation of the Rural Electrification Administration and federally supported rural electrical co-operatives.

On the other hand, technology that uses available products and costs the same as a few dairy cows poses much less of a risk to commercial lenders and investors anxious to capitalise on innovations. Micro-CHP could do for

energy what cellular technology has done for rural communication in even the world's poorest regions.

"There are lot of models that are a different way of looking at bioenergy investment in Africa rather than this huge model that we've been looking at before that hasn't quite seemed to work," said Meghan Sapp, who heads Pangea, an organisation that promotes bioenergy production in Africa.

Sapp, speaking at the World Biofuels conference, said investors had taken a breather in Africa since the global economic crunch. In 2008, international investors were involved in 100 bioenergy projects valued at more than US\$50 million, compared with none today, she said.

Size does matter when trying to supply energy to grids and growing populations. But small renewable energy projects may be a better fit in developing countries in need of more productive agricultural sectors. ■

UK Budget leans to green

The coalition government has backed up its claims of being eco-aware with a budget that includes several green elements

By Mike Scott

- A carbon price floor for power generation was introduced
- The government has created a Green Investment Bank (GIB) earlier than expected
- Relief for carbon capture and storage and combined heat and power was also included

There have been many who have doubted the UK coalition government's commitment to its pledge to be the "greenest government ever," but it went some way to living up to that aim in last week's Budget, which included a number of green elements.

The most notable features were the introduction of a carbon floor price for electricity generation, the creation of a Green Investment Bank (GIB) a year earlier than planned and funding for four carbon capture and storage (CCS) plants.

Low and slow

The carbon floor price will be introduced from April 2013, starting at GBP16 (US\$25.76) per tonne and rising to GBP30 (US\$48.31) per tonne by 2020.

"This would in effect create a tax on fossil fuel generators in order to provide more support for renewable or low-carbon generators," said Elaine Coverley, divisional director of equity research at Brewin Dolphin. "Specifically, it provides financial support for new nuclear power, without the government having to provide direct subsidies."

Andrew Horstead, risk analyst at

energy and carbon management specialists Utilyx, said: "While it's encouraging to see the UK become the first country in the world to introduce a carbon floor price, GBP16 (US\$25.76) per tonne from 2013 is too low if real investment in green energy is to be encouraged."

Based on current carbon prices, the floor price would not kick in until 2014, he said. "This is not soon enough to stimulate the sort of investment that is required if we are serious about decarbonising the electricity sector." ►►