

Bio-gas – the orphan of the renewable energy mix?

THE widespread adoption of bio-gas as a reliable alternative energy source seems like a no brainer. Capturing energy rich methane produced from decaying materials is a proven technology, yet its adoption as part of the renewable energy mix appears to have been overshadowed by wind and solar.

CBN posed a series of questions to the Southern African Biogas Industry Association to clarify the position of this under-rated fuel, and its chairperson Jason Gifford provides extensive insight.

Q: The generation of alternative energy from bio fuels is not new and the technology is well tested around the world. The extraction of methane from the landfill sites around Durban hit the headlines more than 10 years ago but apart from these projects, there has been a slow up-take of the technology. Why is this?

A: The growth of the biogas industry (including landfill gas extrac-

tion for beneficial use) has been left largely to the private sector without any form of national support. The Renewable Energy Independent Power Producer Programme (REIPPP) was a major success for the likes of Wind and Solar but excluded biogas as most biogas projects are below 1 MWe – the minimum REIPPP project size – the lone exception was a landfill gas project which was accepted and is now generating power into the national grid. When the Department of Energy (DOE) Independent Power Producer (IPP) office introduced the small scale REIPPP the ceiling tariff offered to the biogas sector was too low to provide an economical return on investment. SABIA met with the IPP office and negotiated an increased tariff which resulted in the immediate submission of a multi-megawatt project. To date the PPA has not been signed and, as a result, the project has not been developed. Besides the REIPPP,

there are no other state underwritten schemes that would provide the security that investors (both local and international) require to make investments in the industry.

Despite the lack of investment security, the private sector has developed several biogas projects in the agricultural, industrial and waste management sectors. In a bid to encourage the state to get involved in subsidising the development of the industry, the Southern African Biogas Industry Association (SABIA) is shifting the focus to the greater environmental benefit that the biogas industry provides as opposed to focusing solely on the energy production. Over the last two years SABIA has been working with the various government departments and NGOs to create value for the environmental benefit that biogas offers thereby unlocking economic potential of the biogas sector. Without state support, the development of the biogas sec-

tor will be stifled however we will continue to see a few commercial scale projects being developed every year.

Q: How much of a 'threat' is solar and wind power to the bio-energy industry?

A: Quite the opposite, Biogas for power generation is complementary to solar and wind as it is dispatchable (available on demand) and can produce either baseload or peaking power.

It is important to note that biogas is much more than just a renewable fuel to generate electricity, as an energy rich gas its application ranges from a household cooking gas through to the displacement of diesel in trucks. Common uses include, power generation, heating (industrial and domestic), displacement of liquid fuels and replacement of piped natural gas.

Q: It would appear that successful landfill methane extraction only becomes feasible if a)

large regional sites are involved – scale - b) Carbon credits can be obtained for the project and c) subsidies from amongst others, The World Bank are obtained. Does this not call into question the long term viability of such projects?

A: Subsidies come and go and as result, so do projects. To overcome this, a sustainable pricing model must be developed. For example; if the cost of coal-based electricity took into account all of the harmful environmental and health impacts of burning coal, the cost of electricity would be substantially higher than what we pay now. Technologies that are environmentally positive should be compensated for the mitigation of the dirty power generation emissions. It is not a technology problem it is an accountancy problem, as on one side of the balance sheet only some of the costs are allocated. Once the books are balanced there is no need for subsidies.

With respect to scale, in power generation bigger is normally cheaper. The number of people required to operate a ½ MW biogas combined heat and power plant is the same as it is for a 1MW power plant, however the labour cost/kWh in the one megawatt plant is half that of the half megawatt plant.

Q: In the past, a few wastewater treatment plants in South Africa had utilized the biogas produced by the digesters, feeding gas engines that generated power for the facility or that used the gas to run the vehicles on the plant. A number of these have fallen into disuse and don't appear to be a priority for new plants or extensions to existing. Is this true and why would it be the case?

A: The wastewater sector changed over the years. With the advent of the biological nutrient removal (BNR) process to treat wastewater the use of digesters fell away over the course of about 20 years. With the change in legislation the disposal of sludge requires that it is stabilised and pathogen free. For larger treatment works this is only feasible through anaerobic digestion. As these plants are upgraded and their water use licenses amended, digesters are being refurbished and sludge digested once again. As more of these plants are upgraded and digestion capacity brought online, there should be an uptake in this technology on site.

However, the only way to guarantee that this application is rolled out across the country is



through a government directive.

It makes absolute sense, financially and process wise, for biogas combined heat and power plants to be added to wastewater treatment works. As a starting point it should be made mandatory for all municipal wastewater treatment plants that have a treatment capacity of 50 mega litres per day and more.

Q: Has new wastewater technologies made methane extraction for power purposes obsolete?

A: Not at all. The utilization of sludge as an asset should be priority for wastewater treatment works regardless of water treatment technology as all works should be able to achieve 80% of their electrical requirement from an onsite biogas combined heat and power plant. Only once sludge is viewed as a resource and government enforces the implementation of these plants will this become a reality.

Q: The paper and sugar producers have been converting their waste products into localised energy production that supplement or replace Eskom power in product production. Can you comment on the success of such schemes?

A: Both industries that you cite are examples of embedded generation. Embedded generation is common across all renewable technologies. It is unfortunate that sectors such as sugar, paper and pulp, food processing, etc. do not have an enabling environment to sell excess power to the national grid.

This lack of an enabling environment comes across as a dearth of commitment from national government to reducing the national dependence on coal and reducing greenhouse gas emissions, not only in the power generation sector, but also in other sectors that produce organic waste that could be used to off-set greenhouse gas emissions.

Q: In some enlightened countries, biogas is upgraded, and the isolated methane is used to fuel municipal transport fleets. Is there any likelihood that we might see something similar in SA?

A: This topic has been on the agenda for years however a lack of market certainty prevents developers from investing in

these plants without firm offtake agreements.

For example, all metropolitan municipalities (Metros) have public transport fleets, landfills that are running out of air space, and some degree of source separation making them prime sites for biogas plants. None of the Metros have the will to implement biogas plants as a solution to organic waste material, so it is simply landfilled. Implementation of this simple model is complicated by municipal entities that simply do not want to find a solution and would rather state the same barriers again and again. If there is a will there is a way.

Q: The current dilemma facing Eskom as a primary producer of electricity has turned attention to the energy 'mix' which includes renewables and bio-gas. Discoveries of a possible large-scale natural gas deposit offshore and an abundance of natural gas in Mozambique suggest a swing to gas fired power stations in the future. Can bio-gas compete in this new energy mix?

A: The recent discovery is very exciting news as it will accelerate the transition from coal to cleaner fuels. This should not be seen as direct competition to the biogas sector but as an enabler for the sector. The use of natural gas in South Africa is very limited and there has been very little development of gas infrastructure to end users. The current pipelines are at capacity and the cost of building new pipelines is extremely high. A more realistic model may be the development of mini gas grids which are supplied with liquified natural gas from central processing facilities. The ability to inject upgraded biogas into these mini grids is a very exciting prospect for our industry.

The South African market must for our own sake de-carbonise; natural gas is a good start however it should only be viewed as an interim step. Denmark is a great example of where natural gas has been used as an interim fuel, partly because their reserves are in decline, but mainly because the value of biogas is seen as a renewable replacement for natural gas (a fossil fuel), with the potential to replace all natural gas in their network by 2035.



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Bio energy

Arup believes bio-energy offers a unique opportunity to diversify the energy supply mix whilst addressing energy supply and waste management challenges in society.

With quality people and a passion for a holistic design approach, we provide solutions for today's energy challenges.

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