

## Towards a zero waste society: An interview with Rolf Stein

Advanced Plasma Power chief executive Rolf Stein shares with Eco-Business how the British firm is focused on bringing innovative waste-to-energy technologies into the mainstream to maximise the value of waste while reducing its impact on the environment



*Advanced Plasma Power's chief executive officer Rolf Stein. Image: APP*

Rolf Stein is, in his own words, a dad and concerned citizen. He left a cushy job at Hewlett Packard and Apple to join the growing waste to energy and renewable power generation industries to help the environment.

He says he is applying his experience in information technology to technology for sustainability. So since working in the plasma industry in 2006, he rose from commercial director of Tetronics International and Advanced Plasma Power (APP) to chief operating officer, and now to chief executive officer of APP.

In his position, he is intent on furthering the mission of the UK-based firm, which is to maximise the value waste provides while minimising the impact of waste on the environment.

APP, he explains, can address the world's problems of increasing volumes of waste, increasing landfill levels and decreasing fossil fuel resources. The company has developed a zero-waste and highly efficient waste to energy process that converts discarded material into a clean, hydrogen-rich synthesis gas or syngas. Called 'Gasplasma' technology, it is a patented process that does not require combustion or incineration like most waste management solutions that only add to greenhouse gas emissions. With APP's Gasplasma technology, even leftover ash is processed into a useable product for construction.

APP is also pioneering the development of cost-effective hydrogen from syngas, which can revolutionise several industries, he says, as this helps mitigate the fluctuation of gas pricing and supply.

In this interview, Stein tells Eco-Business why he considers APP a game changer and why the waste to energy sector in Asia has a lot to offer.

## **Advanced Plasma Power started only in 2005, so it's a fairly new company. How did the business begin?**

Tetronics, the sister company to Advanced Plasma Power, developed the Gasplasma process for the recovery of heat and power from municipal and commercial waste. Following this, InvestSelect spun off (seeded) Advanced Plasma Power Limited (APP) in 2005 as the exclusive licensee of Tetronics' Gasplasma technology, in order to develop renewable power generation projects. APP now owns the Gasplasma technology and associated intellectual property.

To give you some background, Tetronics is a specialist British engineering company recognised as a world leader in high temperature plasma technology. The company has a successful track record, and has deployed its patented plasma technology – a key component in APP's Gasplasma process – in over 80 installations around the world. Tetronics' plasma technology has been used at very large scale in a range of applications, including hazardous waste treatment and metal recovery.

## **What is plasma technology exactly? And how does the waste to energy process work?**

Gasplasma is a unique combination of two proven technologies: gasification and plasma conversion. The gasifier transforms the organic material in the Refuse Derived Fuel (RDF) into a crude syngas containing tars and chars. It does this by heating the RDF to a high temperature, around 800°C, in a highly controlled reduced oxygen environment. The fluidised bed gasifier allows for the production of a consistent syngas and achieves high conversion efficiencies.

The crude syngas is then passed into the separate plasma conversion unit. Here, intense heat from the plasma arc is required to crack the chars and tars. However, Gasplasma is one of, if not, the most efficient processes on the market. The cracking then creates a clean syngas.

Right now, as populations and waste levels rise, and competition for fossil fuels increase, we are left facing a double-edged problem: rising landfill levels and limited fossil fuel reserves are placing a combined strain on the environment, infrastructure and budgets.

But our next-generation two-stage thermal process is the answer to this problem. Like what I explained earlier, it converts residual commercial and municipal waste into a clean and consistent quality synthesis gas, which can then be used to fuel gas engine power plants or converted to create substitute natural gas or other fuels, such as hydrogen. The process generates no-waste outputs as any ash is vitrified into an environmentally stable and saleable construction product, which we call Plasmarok.

APP's Gasplasma process is a game changer for managing waste in the built environment as it produces no waste outputs and has low emissions. The plants can sit unobtrusively on the edge of towns using the waste to sustainably provide heat, power and fuels in exchange. It is a scaleable and sustainable means for waste management and power and fuel generation.

## **If this process can hit two birds with one stone, how come this solution hasn't achieved mainstream status?**

APP has a number of projects in the pipeline that are due to come to fruition imminently. However, as with any pioneering technology, there are challenges for APP associated with pioneering advanced conversion technologies and building a first-of-a-kind commercial facility. APP will have to pave a first route to market for this technology.

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For example, new technologies are more expensive to deploy to begin with until economies of scale can bring down costs including the costs of finance.

Presently, it is a challenging environment in which to raise money so APP has a very rigid contracting and project finance structure and with our advanced technology, investors can be assured of an attractive proposition given the right long term contracts are in place.

## **What makes APP different from other waste to energy providers?**

We believe we have certainly one of, if not, the most efficient processes for the conversion of this residual material into electricity and this is all down to engineering, ensuring maximum heat recovery and obtaining as much value from waste as possible. This value is not only electricity. We can also offer other, more flexible, solutions downstream and we are in particular focusing on the production of green gas and hydrogen.

We obtain as much value from the residual material as possible as a fuel and materials resource. We remove recyclates, particularly metals, glass and dense plastics, and from the balance extract as much value as possible as a source of energy.

In terms of the plant itself, it is compact with a small footprint and has a low environmental and visual impact so the technology can be located close to waste arisings or the towns and cities where the waste is generated, reducing transport miles and costs. We have process heat that can be exported to make combined heat and power a reality, rather than having to site these plants in the middle of nowhere. That's a key design factor.

## **What is the potential for this technology in the Asian market?**

APP believes that the waste to energy sector is vastly under-developed in Asia but has some of the greatest potential. Waste management is a growing problem, for example in Singapore, waste is expected to double every decade. This abundant resource could be sustainably used to generate clean and renewable heat, power and fuels if the right technology is installed. This would reduce the impact on the environment and pressure on resources whilst simultaneously providing energy security.

In addition to its UK projects, APP is also making progress on plans to license its technology to international developers in other markets. It aims to provide engineering design in addition to key components and we are very close to securing a number of international orders in Asia. This is a key focus area for APP.

**You used to work for HP and Apple. What made you switch from the IT industry to the waste to energy business?**

Having worked for the world's leading information technology companies, I am now applying my experience to technologies that can benefit the environment and reduce our impact on the planet. As a concerned citizen, for example, I drive an electric car. I wanted to make the move into the renewable energy sector and APP and its team of engineers with a leading technology was the obvious choice. I embrace technological innovation and as we move to commercial deployment, I hope that many communities will benefit from this local sustainable solution to waste management and power generation.