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International Solid Waste Association



WASTE MANAGEMENT WORLD®

Euro 12,-

Special Edition
RECYCLING

CALCULATING plastic pollution

A large, thick black outline of a washing machine, positioned centrally on the page. The top edge of the machine is wavy, representing the detergent dispenser area.

**WHOSE
WASHING UP
IS IT?**

Bank To The Future

EIB & Partners to Back Circular Economy

Swerving the Sword

SWANA's Advice on Curbside Recyclers



WASTE MANAGEMENT WORLD®

Recycling Special Edition

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ECOMONDO 2019 FLOOR



ARIES CLEAN ENERGY: TAKING GASIFICATION MAINSTREAM IN THE US

Gasification is not new. It's been around in a number of guises for many years, but when it comes to the thermal treatment of wastes, other technologies have largely been favoured. However, with both its fluidised bed and downdraft gasification technologies, Franklin, Tennessee, based Aries Clean Energy is looking to change that.

By Ben Messenger

Formed in 2010, in its early years as PHG Energy, the company installed 12 gasifiers at brick manufacturing plants in the Southeast of the US—providing synthetic gas from biomass sources for use in kilns.

“We acquired two technologies - a downdraft gasification and fluidised bed technology, both of which we acquired,” explains Greg Bafalis, CEO of Aries Clean Energy. “The downdraft had been developed by a company called Associated Physics of America and they had constructed a number of small-scale units, 8 tonnes a day, focused on using woodchips which were used to make a producer gas which was then fed into a brick kiln.”

When the ‘Great Recession’ hit the building industry brick production halted and the price of natural gas plummeted. At that point, the company began to look at deploying its technology with businesses and municipalities to reduce their GHG emissions and waste sent to landfill, as well as creating green power.

Fast forward to 2016, still going by the PHG name, the company completed construction on the world’s largest downdraft gasifier in Lebanon, Tennessee. With a maximum throughput of 64 tonnes per day, the plant diverts over 8000 tonnes of green wood, pallet wood,

municipal sludge and tyres from landfill each year.

“It’s nominally a 64-tonne per day unit. We built one for the City of Lebanon, Tennessee at the wastewater treatment facility,” Bafalis tells WMW. “That came online back in 2016. That unit runs commercially today, taking primarily urban wood waste, mostly pallets from car manufacturing units and then generates about 300 kW of electricity that goes back to the wastewater treatment plant.”

He adds that downdraft gasification is by far the least complex and most productive of gasification technologies. It has been used for over 100 years, but the limiting factor has always been internal mechanical structures that prevented simply making the equipment bigger. However, the company’s patented technology eliminates this problem and results in a process that is very straightforward with only a few moving parts in the gasifier itself.

In 2017 PHG renamed to Aries Clean Energy to reflect its evolution into not just a clean energy company, but a sustainable waste disposal firm with a number of successful projects under its belt for both industry and municipalities, cleanly converting a mixture of wood waste, biosolids and scrap tires to electricity.

“The old name, PHG Energy, worked well for us when we basically offered in-

dustrial fuel gas conversion equipment,” says Bafalis. “Aries Clean Energy is a brand that much better represents what we do today as well as our product line and focus going forward.”

FLUIDISED BED GASIFICATION

As another feather to its bow, in 2015 the firm acquired multiple intellectual property assets and a municipal fluidised bed gasification plant in the bankruptcy of Florida-based MaxWest Environmental Systems, Inc.

The process that converts carbon-containing waste material into a synthetic fuel gas, along with a very small amount of inert char. Waste feedstock is fed into the gasifier and a controlled amount of oxygen is introduced. Once necessary temperatures are achieved and maintained, a thermo-chemical process converts the bio-

“It’s more than the addition of jobs to our City, it’s taking a step toward a healthier New Jersey, a healthier Earth.”



Mayor Derek Armstead
mayor of Linden, New Jersey

mass into a combustible syngas primarily composed of carbon monoxide, hydrogen and methane. That sustainable fuel can be deployed in a commercial dryer to remove moisture from biosolids. The system can cleanly reduce volume by as much as 95%.

“Maxwest built a commercial-scale facility in Sanford, Florida near Orlando and ran it for about 18 months,” says Bafalis. “The private equity firm that was funding them ran out of cash and we acquired the system and all the patents out of their bankruptcy... We have now redeveloped that system and just completed permitting on our first large scale fluidised bed system in Linden, New Jersey near New York City.”

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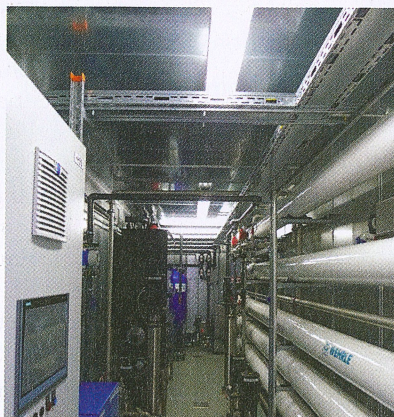
In July this year Aries Clean Energy received all approvals required to construct New

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Booth 10

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**Presentation about
“Modernization of leachate
treatment plants”
on 8/10/2019**

**Guided tour to our
High-Performance MBR
Plant for Bilbao landfill**

Jersey's first biosolids-only gasification plant which it says will be the world's first large-scale biosolids gasification facility.

The Aries Linden Biosolids Gasification Facility will be located in a re-purposed building within the Linden Roselle Sewerage Authority (LRSA) complex, 20 miles from Manhattan. Aries will deploy its patented fluidised bed gasification system that was designed specifically for processing biosolids. The system will reduce the volume of biosolids from 400 tonnes per day into 22 tonnes of biochar, a beneficial byproduct of the gasification process which can be used as a substitute for fly ash in concrete. The renewable energy that is generated from the system will be recovered and used within the system, so no fossil fuels are used during normal operations. "The facility that was running in Florida

FACTS

22 TONNES

Biochar to be produced from 400 tonnes of biosolids per day at the Linden Biosolids Project

Amazon

Aries GREEN™ Biochar is now available via the Amazon Marketplace.

94%

Uptime achieved at the Lebanon plant over the last 100 consecutive days in 2018.

was about 25 tonnes a day. The great thing about fluidised beds is that they scale fairly easily," notes Bafalis. "The vessel itself, how we seed the sludge, the ability to gassify the sludge, the operating system around that are all part of the patent. There are other fluidised bed systems that do other feedstocks, mainly coal... but this will be the largest gasification of biosolids that we can find anywhere in the World."

In terms of financing the project Aries is using an avenue that is available in the US on a state-by-state basis called private activity bonds.

"They are tax-free bonds so the interest paid to the bondholder is tax free. They are used for projects that are done by private companies for public good such as waste water treatment, anything that



Energy: recycled

Waste management is a complex matter. Conditions vary between countries.

Sweden's well-developed district heating systems are partly fueled by waste.

That is, waste that cannot be recycled or treated in any other way,

or would otherwise end up in a landfill in another country.

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helps government providers and benefits infrastructure,” explains Bafalis. “We qualify because we’re taking the biosolids. We were able to get an allocation of those bonds through the Local Authority... We got our allocation that provides 75% the capital required to build the facility and then we have our private equity fund that is funding the other 25%... We are in our financing process right now, we have all of our funding and we are very confident in the facility to operate to the standards we want it to.”

THE NEXT BIG STEP

In the near term, construction of the Linden Biosolids project should take around 12 months, with a further three months to achieve full commercial operation. But Bafalis also sees big opportu-

“With the fluidised bed and with the biosolids application, we’re not producing any electricity, we are solely producing the gas. The downdraft gassifier was really designed to be an electric production facility.”

Greg Bafalis
CEO of Aries Clean Energy

nities round the corner for the company. “We’re a little different in that it’s our equipment, the gasifier – it’s our design, our patent and we have it fabricated – but we also develop our own projects,” he says. “We’re actively putting projects together, but like anything you have to learn to walk before you run. Our first downdraft system has been operating for a couple of years so we have a lot of traction, especially in California because of their landfill diversion and their high power process – a couple of those are in permitting right now.”

“With the fluidised bed, we’re not just focused on the US, we’ve had a lot of interest from Australia and internationally,” Bafalis concludes. “Once we get this system up and running, we think this is a global business for us.” —



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Hangzhou Linjiang Waste-to-Energy Plant is located in Hangzhou, the capital city of China's Zhejiang Province.

The Plant is designed with the capacity to treat 5220 tons of municipal solid waste on a daily basis, including six 870 TPD SUS-Hitz-Von Roll grate incineration lines, and adopt advanced flue gas cleaning process including SNCR,

semi-dry and dry DeNO_x, activated carbon injection, fabric filter, GGH, wet scrubber, SGH and SCR, in order to realize the ultra-low air pollutant emissions from the chimney.

Awarded as Design, Build and Operate Contractor, SUS Environment is planning to start operation of this plant in 2020.