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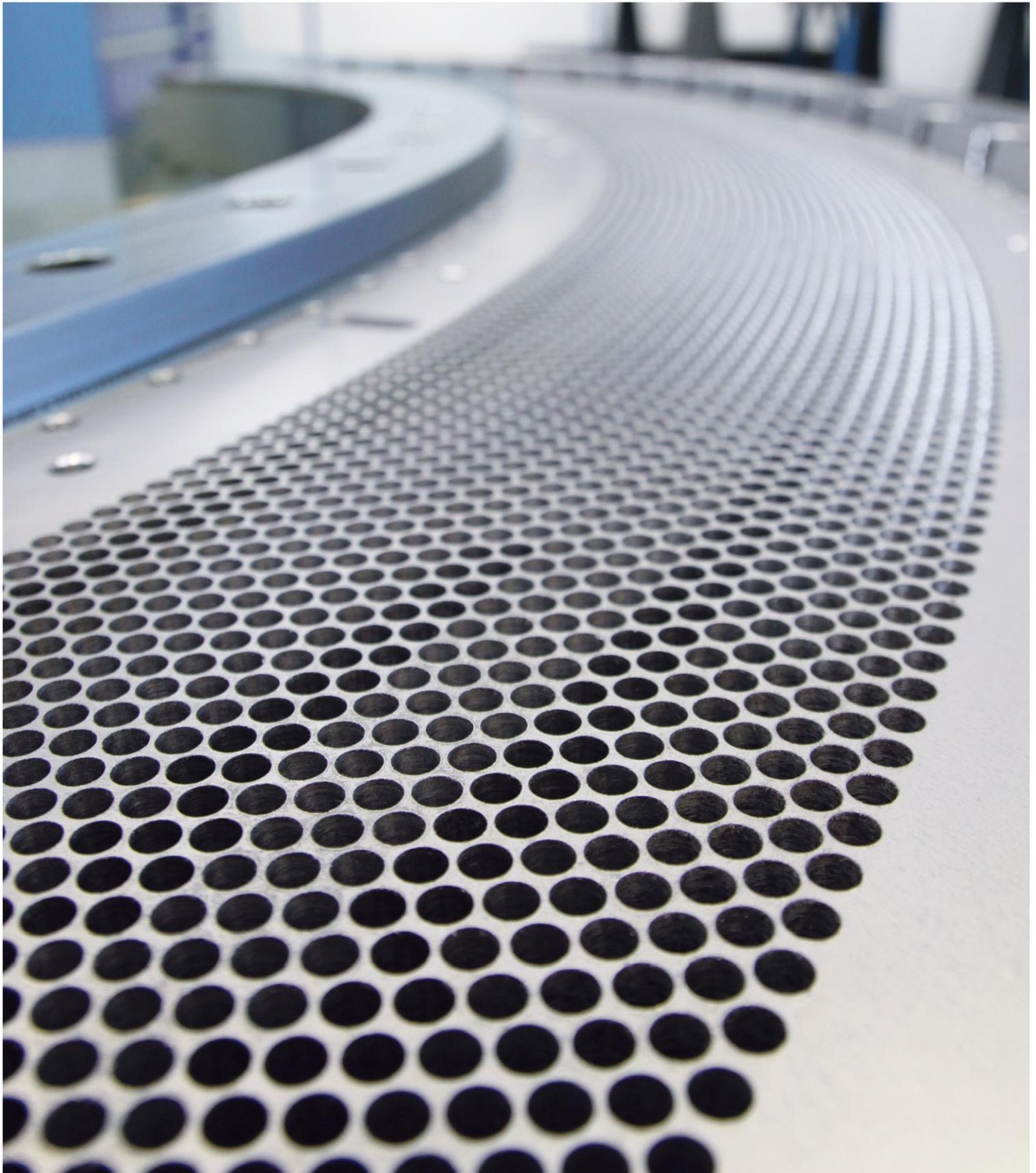
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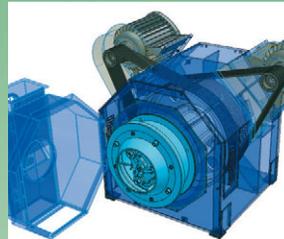


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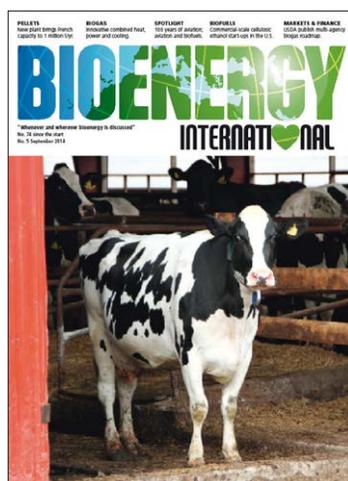
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COVER PHOTO



Cow 5469 peers out of her shed at Wapnö dairy farm in Sweden, probably wondering what the fuss is about. The manure based biogas energy system together with an innovative heat-driven absorption refrigeration process supplies the heat, power and cooling needs for Wapnö.

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2014 AND COWS CAN FLY, WELL ALMOST

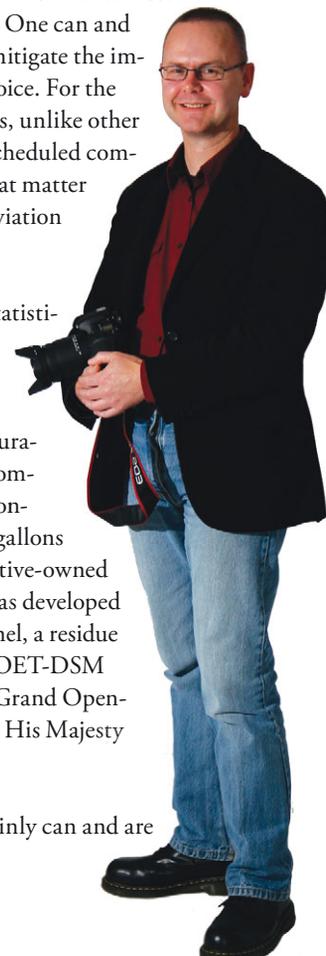
Why does a cow make the front page and what has she got to do with energy networks, where's the beef so to speak? Well quite a lot as it happens and moreover cows like 5469 have the potential to do much more. Firstly she is not alone but part of a global herd that, according to the U.N. Food and Agriculture Organization (FAO), numbered some 1.4 billion animals in 2010. A population that is projected to almost double by 2050 as the global per-capita demand for meat and dairy products continues to grow. The connection, of course, is that a cow gives rise to manure and this can be used as a feedstock for biogas plants to produce biogas for heat and/or power or upgraded to biomethane. Nothing new there. However this cool front-page cow resides at Wapnö, a Swedish farm that has one of the largest dairy herds in the country and the smallest dairy. By using an innovative heat-driven absorption refrigeration process the cows supply all the feedstock needed for the biogas plant to supply Wapnö with all the cooling, heat and electricity needed.

Summer 2014 marks a century since the outbreak of what was to become the First World War (WW1), the "the war to end all wars". Unfortunately it didn't. 2014 also marks 70 years since D-day, one of the defining military manoeuvres for the outcome of the Second World War (WW2) that took place on the beaches of Normandy in Northern France. Indeed it is 2014 and sadly the world seems to be in a dismal state of strife and conflict with the highest number of displaced people since WW2. There is though another interwoven centennial that has a global impact. 2014 marks a century of scheduled commercial aviation and the advent of military aviation, the latter of which had defining roles in both WW1 and WW2. The first such scheduled flight is reported to have taken place on the 1 January 1914. A century later the sector expects to carry 3.32 billion passengers and 51.7 million tonnes of freight on some 33.8 million scheduled passenger flights. Statistically speaking roughly half the world's population will have taken to the skies on a scheduled passenger flight at some point during the year. Needless to say there is an environmental cost and climate impact associated with all this scurrying 1 km up the skies. One can and should question if all this is necessary and, if so, what can be done to mitigate the impact. For the individual and the industry the answer is in part about choice. For the aviation industry there is at present no realistic alternative to liquid fuels, unlike other modes of transport. Thus it is both significant and fitting that the first scheduled commercial passenger flights using a biofuel blend are emerging. And for that matter also significant that the U.S. Navy has for the first time ever included aviation biofuels in its ordinary fuel purchase tender.

Global oil and gas major BP released its annual and well-respected statistical review of world energy. According to BP's review, world biofuels production grew by 6.1 percent in 2013 to just over 65.3 million tonnes oil equivalent. Increased biofuels output in North America, South and Central America and Asia Pacific outweighed declines in Europe and Eurasia. Notwithstanding Beta Renewables plant in Italy, the first wave of commercial advanced biofuel production facilities in the U.S., i.e. using a non-food cellulosic feedstock, are coming online. First to commission with gallons of cellulosic ethanol out, was Quad County Corn Processors, a cooperative-owned corn (maize) ethanol producer that operates one plant. Quad County has developed its own bolt-on technology to produce cellulosic ethanol from corn kernel, a residue from its ethanol production. Next up and featured in this issue is the POET-DSM "Project Liberty", which at the time of going to press will have a Royal Grand Opening with King Willem-Alexander of the Netherlands to attend. Perhaps His Majesty will have been on a KLM biofuelled flight at least on part of his trip.

While cows themselves may not fly, their after-life by-products certainly can and are being used to produce sustainable alternative aviation fuels.

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ARTICLES

FEATURE : ENERGY NETWORKS

Very cool with cow heat and power	10
Probably the world's largest and most efficient CHP unit	14
B&W Vølund to build 280 MW Dong Energy plant	15
The world's best energy system	17
Pécs, first with biomass heat	17
EDF, Veolia close deal	17

PELLETS

U.S. housing recovery set to stress test pellet sector	20
Round the clock production	21
Groupe Archimbaud commission second pellet plant	23
Transforming palm waste into value-added biomass fuels	25

SPOTLIGHT: AVIATION & BIOFUELS

LIQUID FUELS	
Full-scale ethanol from straw	30
PulPaper 2014: Bio is the future	32

MARKETS AND FINANCE

BioOpinion - Charlotte Morton	37
RHI biomass heating installations pass 1GW capacity milestone	38
Pix Pellet Nordic CIF	38
BTEC - Update	39
ABC welcomes new multi-agency roadmap	39

BIOGAS

EU and Germany reach deal on revised EEG, challenge for biogas	40
Best ever UK AD & Biogas	41

SOLID FUELS

EU funded "hedge" biomass project	43
Boilers and Burners Directory 300 kw to 1 MW	44

EVENT REPORTS:

Interforst - An International Scorer	47
Euroforest - a resounding succès	49
Calendar	52

ADVERTISERS

A.B.S Silo-und Förderanlagen GmbH	42	Informa Agra Events	46
Advanced Cyclone Systems, S.A.	34	IQR Systems AB	12
Andritz Feed & Biofuel	2	Jiangmen OSCA Bioenergy Source Ltd.	36
Argus Media Ltd	46	Jiangsu Muyang Holdings Co., Ltd	24
AS Hekotek	24	La Meccanica srl di Reffo	22
Bandit Industries, Inc	51	Lachenmeier Monsun A/S	35
Bruzaholms Bruk	35	Minimax GmbH&Co.KG	34
C.F. Nielsen A/S	35	Münch-Edelstahl GmbH	12
Compte-R	42	O.Ö. Energiesparverband	Insert
Continental Biomass Industries, Inc.CBI	52	Peterson Pacific Corp.	16
CPM Europe B.V.	6	Prodesa Medioambiente S.L.	22
Di Piu s.r.l	36	Recalor S.A	36
Dieffenbacher GmbH	3,34	Reed Expositions France - Pollutec	48
Ekoterm Proekt Ltd	36	Salmatec GmbH	5
Enerstena Ltd	18,19	Solar Promotion GmbH	46 & Insert
European Biogas Association	46	Stela Laxhuber GmbH	22
Expobiomasa 2014	48	Stockholms Bulkhamn AB	35
Expomal International Sdn Bhd	49	Sugimat S.L.	35
Fisker A/S	35	Swiss Kombi W.Kunz dryTec AG	34
Five Continents Machinery Co. Ltd.	34	Uniconfort S.r.l	34
GTS Syngas GmbH	16	US Industrial Pellet Association USIPA	49
Herz Energietechnik GmbH	42	Xuzhou Orient Industry Co. Ltd	4
IFP Ingenieurbüro für Pelletiertechnologie	36		

14 Dong Energy's Avedøre combined heat and power (CHP) plant outside Copenhagen, Denmark is probably the largest and most efficient CHP unit in the world.



10 Integrated dairy farm with own on-site dairy products processing in Wapnö, Sweden. Using only manure as feedstock, the biogas is used to supply the entire Wapnö agri-complex with heat, power and -11°C cooling. It is perhaps the most energy efficient and environmentally optimal biogas system ever built.



23 Groupe Archimbaud commission its second pellet plant. The new 160 000 tonne-per-annum Pellet Land plant in Labouheyre, Aquitaine will bring the French annual pellet production capacity past the 1 million tonne mark.



25 With 39 percent of global production, Malaysia is the world's second-largest palm oil producer. The company Detik Aturan Sdn Bhd is one of a growing number of pioneers producing biomass pellets using empty fruit bunches (EFB) as feedstock.



30 Two full-size factories for cellulosic ethanol will be up and running this autumn in the U.S. Midwest. POET-DSM's "Project Liberty" plant in Emmetsburg, Iowa is one.

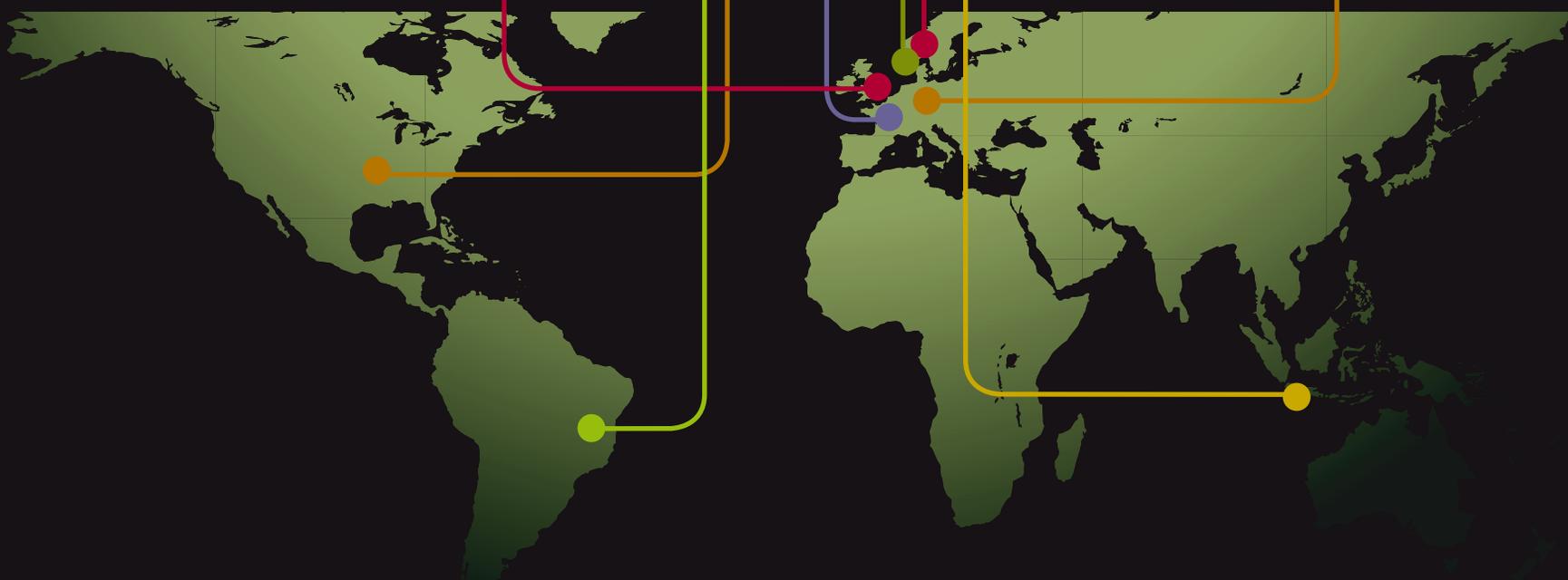
28 2014 marks a century of scheduled commercial aviation, part one of the "Aviation and biofuels" story.



37 Charlotte Marton, Chief Executive of the Anaerobic Digestion and Biogas Association (ADBA) gives her "BioOpinion" into the British biogas boom.



47 Held in a sweltering hot July the 11th edition of Interforst was a record-breaking and bullish forestry tradeshow with more exhibitors, space and visitors than ever before.





At Wapnö it is all about the cow and energy efficiency. The slurry from the cow sheds is pumped to the insulated buffer tank.

VERY COOL WITH COW HEAT AND POWER

Wapnö is an integrated dairy farm with own on-site dairy products processing. Located just outside the city of Halmstad on the west coast of Sweden, Wapnö recently installed an innovative biogas-based energy system. Using only manure as feedstock, the biogas is used to supply the entire Wapnö agri-complex with heat, power and -11 °C cooling. Along with odourless fertiliser and 2 MW energy to spare, it is perhaps the most energy-efficient and environmentally optimal biogas system ever built.

THE GLOBAL DEMAND FOR MEAT AND DAIRY products continues to grow at profound rates, especially in the developing world. According to the U.N. Food and Agriculture Organization (FAO), the per-capita milk consumption in developing countries almost doubled and meat consumption more than tripled between 1980 and 2005. During the period 1980 to 2010 the global cattle population grew 17 percent to reach 1.4 billion animals. The Consultative Group on International Agricultural Research estimates that by 2050, the global cattle population will have almost doubled to 2.6 billion animals to provide for an estimated human population of 9.7 billion.

Local production

It follows that as animal and human populations increase, so too does the need to increase the production of food, fodder and feed in an energy efficient and environmentally sustainable way. Wapnö's current contribution to the global cattle population is around 3 300 animals of which 1 300 are milk cows and the rest calves and heifers. The 2 200 hectare (ha) holding is made up of 1 650 ha arable land, 100 ha pastures and 450 ha forest and it is run as a limited company with some 50 employees.

In fact Wapnö is an agri-business complex that has evolved around its focus on the cow. Today the on-site business operations include milk and

associated dairy products that are sold to supermarkets in the region, a 21-bed hotel and conference venue, a restaurant that sources its ingredients, including beef, from the farm, and a "Farmer's Market" shop for products from the farm.

The company has a strong local production and sourcing ethos. According to Wapnö CEO Lennart E. Bengtsson the primary task for arable production on the farm is to provide feed, fodder and bedding for the cows, thereafter food production. The animals are kept open range year-round having free access to large sheds with bedding, feed and water. On an annual basis about 10 000 tonnes of grass and whole crop silage, 3 700 tonnes of grain and 1 110 tonnes of straw of which 400 tonnes is chopped for bedding, is produced.

Energy optimisation

Wapnö's energy "hoof print" however is very different to any other livestock farm or dairy. In June 2011 a decision was made to invest in an innovative biogas-based energy system to cater for the entire energy needs of its operations, that is cooling, heat and electricity. The Danish company Lundsby Bioenergi A/S was given the c. 12 million DKK contract to provide the biogas system on the pre-condition that it could commit to a minimum daily biogas output. Furthermore the only feedstock for the biogas plant that

would be made available to achieve this output were going to be residues from the farm, 36 000 tonnes of slurry, 3 000 tonnes of solid manure and 700 tonnes of feed residues. The plant was commissioned in April 2012.

– This is more of a challenge than it sounds. Cattle manure on its own has a relatively low methane yield and long retention time. And we had to ensure a minimum daily biogas yield that would be enough for the downstream energy system, said Karsten Hjorth, project manager Lundsby Bioenergi A/S.

From a plant perspective this is usually compensated by blending a percentage of a crop-based feedstock such as maize silage. However at Wapnö this is not an option as company policy forbids the use of any purpose-grown feedstock, the arable land has too high a "food value" and is used for food and feed production.

Unconventional

The biogas plant itself is a conventional mesophilic two-stage anaerobic digestion plant with a number of special adaptations and features all designed to make it as energy efficient as possible, in particular with the use of heat. What makes the Wapnö setup unique for a farm-based biogas plant is that apart from supplying electricity and space heating to the entire complex, the heat is used to supply cooling.

Slurry from the cow sheds is collected and pumped to an insulated buffer tank that is buried at ground-level. Manure, bedding material and feed residues are fed into a Trioliet double-auger stationary feeder mixer using a front-loader. The luke-warm, 10-20 °C, slurry from the buffer tank and the macerated material from the feeder mixer are fed into an insulated mixer tank where the

material is stirred to a homogenous mass.

The mixer tank is also heated as the incoming material from the feeder mixer is cold. A special feature is that it is heated by using a heat exchanger to capture the heat from the outgoing warm digestate before this goes into storage. The pre-heated and mixed material passes a stone separator before being pumped into the 3 800 m³ digester where 70-85 percent of the biogas volume is produced. Here the temperature is increased to around 40 °C by heat exchanger on a hot water circuit. The digester also doubles for biogas storage with hydrogen sulphide (H₂S) reduction to 100-200 ppm. This enables scheduled stops on downstream equipment such as maintenance services without biogas loss due to flaring or plant shutdown.

From the digester the still biologically-active material is fed into the 3 800 m³ post-digester unit where the remaining 15-30 percent of the biogas is produced. From the post-digester the digestate is fed past the mixer-tank via a heat exchanger to extract the heat before going into the digestate storage tank.

Solids are separated from the digestate and

“Wapnö is a very innovative project, using 37°C manure to supply -11°C cooling as well as heat and power.”

KARSTEN HJORTH, Project Manager
Lundsby Bioenergi A/S.

water is added when it is applied as an odourless organic fertiliser on Wapnö’s fields. The fibrous solids are dried, packed in fertiliser bags and sold as a soil improvement product.

Power and cooling

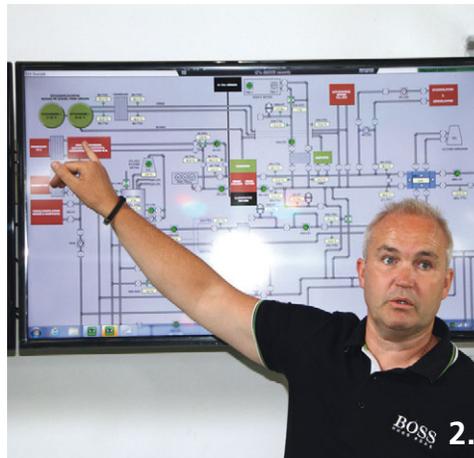
Water is removed from the biogas and the condensate returned to the mixer tank. The biogas is piped to the combined heat and power genset located next door to the dairy some 400 m away from the biogas plant. To keep emissions of nitrogen oxides (NO_x) down, a urea-based NO_x reducing agent is used.

The heat from the water-cooled 300 kW capacity rated MAN gas engine genset is used as the heat source for the Absorption Refrigeration Plant (ARP) as it provides a high and stable flow and water temperature, which is important for the overall efficiency for both the engine and the ARP. The heat in the flue gas is also used. The outgoing engine exhaust has a temperature of 500-600 °C and has two heat exchanger circuits in succession.

The first one is connected to the engine cooling and the ARP circuit to ensure the stable operating temperature. This brings the flue-gas temperature down to around 180 °C. The second flue-gas heat exchanger is connected to the existing hot water network for space heating including the digester. Other heat pumps that are connected to this network include the engine room to utilise radiant heat from the engine and in the dairy.



Photo Wapnö



(1) Karsten Hjorth (left), Project Manager, Lundsby Bioenergi A/S and Lennart E. Bengtsson, CEO, Wapnö signed the c. 14 million DKK project deal in June 2011. The plant was commissioned in April 2012. (2) Jan Thorbjörnsson, Halmstad Kylservice AB explaining the complex heat and cooling flows at Wapnö. (3) Some of the dairy products from Wapnö, Sweden’s largest dairy farm and smallest dairy. (4) Wapnö is an open farm that receives visitors year round. Here a group of international attendees to World Bioenergy. (5) – A PLC steer and regulation system is used to monitor and control the biogas plant operation, said Karsten Hjorth. (6) Heavy insulation and heat pumps capture radiant heat from the genset.



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By using the heat from the milk the heat pumps installed in the dairy can raise the water temperature from 38 °C to 60 °C to supply the digester with heat if there is no heat in the rest of the system, for instance a very cold winter's day.

– This is a unique set-up because normally we would use the heat from the gas engine for the digester. It is really exciting as we have enquiries for biogas projects where heat is not needed but cooling is, commented Karsten Hjorth.

Heat to cool

The ARP uses ammonia as the refrigerant medium, can cool down to -11 °C and supplies all the cooling and refrigeration needed at Wapnö; the dairy production process, cold storage as well as the shop and space cooling on the entire premises. Supplied by Dutch chiller specialists Collibri BV it was developed together with the local heat and cooling installation company Halmstad Kylservice for Wapnö.

– The task was to extract as much cooling as possible from the supplied heat. Once the calculations and flows were worked out we had to find a supplier who would build such a chiller that could use 90 °C water and cool to -9 °C, said Jan Thorbjörnsson from Halmstad Kylservice.

An ARP consists of a high-pressure and a low-pressure part and, just as in a conventional compression refrigeration plant (CRP), the refrigerant is liquefied under high pressure in the condenser and evaporated under low pressure in the evaporator.

The ARP absorption cycle

The main components of the solution cycle are the absorber, the desorber and a liquid pump. The solution cycle uses the ability of water to dissolve ammonia vapour to form a solution. This process takes place in the absorber, which works on the same low pressure level as the evaporator.

The solution entering the absorber is weak with a low concentration of ammonia and is able to absorb the ammonia vapour coming from the evaporator and dissolve it. The now ammonia-rich solution has a high ammonia concentration and is pumped to the desorber, which works on the same high pressure level as the condenser.

By heating up the desorber, this concentrated ammonia solution re-separates into ammonia vapour and a weak ammonia solution. The weak solution flows back into the absorber and the



The CHP genset and ARP are located next to the dairy, a urea based agent is used to reduce NOx emissions.

ammonia vapour is purified in the rectification column, so that nearly pure ammonia vapour enters the condenser, where it is liquefied.

A CRP only needs cooling from the environment for the condenser, in an ARP the amount of environmental cooling is more than the double because in addition to the condenser, the absorber needs cooling as well. To improve the coefficient of performance (COP), a term to describe the ratio of useful heat movement per work input, two heat exchangers are installed in an ARP for internal heat exchange: the solution

heat exchanger and the condensate cooler.

– The key difference between the two refrigeration plant types is that to transport the refrigerant vapour from low pressure to high pressure, a CRP uses electricity to power the compressor, whereas an ARP uses a thermal driven solution cycle, a “thermal compressor” if you will. The CRP is 100 percent driven by electrical energy for the compressor. The ARP on the other hand only needs 5 percent of its energy as electricity for the pump and 95 percent as thermal energy to heat the desorber, said Jan Thorbjörnsson.

It is this difference that has enabled Wapnö to go from an oil and power purchaser to a combined heat, power and cooling producer. Not only has the manure-based biogas system fulfilled current cooling, heating and electricity, needs there is room for future expansion. Roughly 2 MWh per annum of heat is still unused and the biogas plant has additional capacity, up to 4 000 head of cattle. There are plenty of ideas and plans, time will tell what is next for this very cool cow heat and power plant.

WAPNÖ

TECHNOLOGY SUPPLIERS

Biogas plant (incl. CHP genset): Lundsby Bioenergi A/S

Absorbent Refrigeration Plant (ARP): Collibri BV & Halmstad Kylteknik AB

INPUT (per annum):

c. 36 000 tonnes cow slurry

c. 3 000 tonnes cow manure

c. 700 tonnes bedding & feed residues

OUTPUT (per annum):

c. 2 100 000 Nm³ biogas

c. 37 000 digestate

ENERGY OUTPUT (per annum):

3 MWh electricity

3 MWh heat to provide 1.7 MWh cooling

1.5 MWh heat for tap water, space heating etc

c. 2 MWh heat potential unused

ESTIMATED ENERGY SAVING (per annum):

1.7 MWh electricity from the grid

25 m³ fuel for the grain dryer

13 m³ fuel oil for space heating

Text & photos: Alan Sherrard

B174/4076/AS

Probably the world's largest and most efficient CHP unit

Dong Energy runs the Avedøre combined heat and power (CHP) plant just outside the Danish capital Copenhagen. Originally designed to fire coal, unit one was converted to wood pellets back in 2002. It is probably the largest and most efficient CHP unit in the world.

OWNED AND OPERATED BY the Danish energy utility major Dong Energy, the Avedøre Power station consists of two units both of which are combined heat and power (CHP). Unit one is a traditional coal-fired power plant commissioned in 1990 and is planned to be converted to biomass. Unit two opened in 2001 and is today running on 100 percent biomass.

Avedøre Power Station was originally designed as a coal-fired plant. When the Danish government decided not to allow new coal-fired units in Denmark, the plant was redesigned to run on natural gas and heavy fuel oil. In order to meet the government's carbon targets for 2020 it became possible in 2002 to obtain subsidies for the production of district heating from biomass. This led to the building of mills, feeders and storage facilities for the use of wood pellets.

– We started to use wood pellets at the plant in 2002, explained Niels Christian Kjaer, Head of Power Plants, Region East, Dong Energy.

High efficiency

Unit one runs on 100 percent coal and the electricity efficiency is 42 percent. Unit two runs on wood pellets and the electricity efficiency is 49 percent in condensing mode. When running in CHP mode the efficiency is approximately 92, rising to 94 percent when a maximum of district heating is used. The capacity for electricity generation is 250 MW for unit one and 575 MW for unit two.

– In CHP mode we get a little less electricity but we get heat for the district heating. We can gener-



Earlier this year delegates attending ACI's European Biomass to Power conference had the opportunity to visit Danish energy major Dong Energy's Avedøre Power Station outside Copenhagen

ate electricity for 1.3 million homes and district heating for 200 000 homes, said Niels Christian Kjaer.

The boiler in Unit two is an ultra super critical boiler with a thermal capacity of 800 MW. The steam pressure is 300 bar and steam temperature is 580 °C.

At Avedøre there is also a straw-fired boiler with a capacity of 45 MW, producing steam with the same data as the main boiler, feeding the same steam turbine. There are also two 55 MW gas turbines. Dong Energy uses coal fly ash into Unit one as a way to prevent corrosion on parts of the boiler.

– We have good experience of this method, said Niels Christian Kjaer.

Wood pellets

– We started using wood pellets in 2002 and in 2013 our annual consumption was 800 000 tonnes. Just under half comes from the Baltic area. About 25 percent is from Portugal. We also have minor volumes coming from Germany and Russia, about 10 percent each, said Niels Bojer Jørgensen, Head of Opera-

tional Fuel Sourcing at Dong Energy.

– The logistics at a power plant this big can be a challenge. We have a lot of different fuels and only have 6.2 meters draft in the harbour at Avedøre. We have no North American supplies coming in to Avedøre due to the harbour.

The vessels are between 3 000-5 000 tonnes and we have our own barges that can carry up to 9 000 tonnes. We have access to a deep-sea harbour where we can do the discharge of cape size ships of 180 000 tonnes of coal, and we can use our barge system. We use it a lot to supply coal and sometimes also pellets, said Niels Bojer Jørgensen.

Sustainability important

– The pellets quality we work with is I2. We operate with something in between I1 and I2. In some cases we can accept I2 and in others we can only accept I1. We can accept up to two percent ash in the wood pellets. But with regards to the particle size we need I1. This is due to the construction of the mills where we grind the wood pellets, he ex-



Niels Christian Kjaer, head of power plants in Region East, Dong Energy.

plained adding that a fourth mill was being installed and is scheduled to be operational in October.

– With that we can run at nominal capacity with 100 percent biomass, so far we have only been able to reach 82 percent of full capacity, said Niels Bojer Jørgensen.

Dong Energy is also a participant in the pan-European utility initiative Sustainable Biomass Partnership (SBP) and on the issue of sus-

tainability Jørgensen is very clear.

– We work together with some other European utilities in the SBP on the sustainability of biomass. I hope that we will have a sustainability system up and running later in 2014. It is important for us that the pellets we use in the power plant are produced in a sustainable way, Jørgensen said.

Fire lessons

The Avedøre harbour has storage facilities for up to 110 000 tonnes of pellets, enough for one month’s consumption. In 2012 there was a fire in the small silo where Dong Energy stores up to 20 000 tonnes of pellets. The fire started on a conveyer belt and once the rubber belt was alight the blaze spread very quickly to the top of the conveyor. At the top it was then impossible to stop the melting burning rubber from dripping down into the silo. Inside the silo the fire started on top of the pellet pile but spread rapidly downwards.

– We learnt that we should not use water to extinguish. Instead we had to open the silo and move pellets out of the silo to extinguish the fire. Another lesson is not to use rubber in conveyer belts. We have changed to a heat resistant and inflammable material, said Jørgensen.

Several parts of the conveyer system were damaged and the small silo was a total write-off. The total loss was 110 million DKK, c. 15 million EUR, though the cost was fully covered by insurance.

– We didn’t suffer any production losses. We were able to use the big silo and run the CHP production continuously as we had 60 000-70 000 tonnes of pellets in the big silo at the time.

Fire prevention

– We use spark detection equipment to prevent the risk of explosion

“It is important for us that the pellets we use in the power plant are produced in a sustainable way.”

Niels Bojer Jørgensen, Head of Operational Fuel Sourcing Dong Energy.

sion and we are trying to prevent self-ignition. We use a vacuum cleaning system to minimise the dust accumulation and lower the risk of dust explosions. We use nitrogen and CO₂ injection in the storage silos. We monitor the temperature and if it increases too much we inject nitrogen or CO₂ to lower the temperature and oxygen levels, said Niels Bojer Jørgensen.

High to low carbon

Dong Energy’s corporate strategy is to shift from 15 to 85 percent biomass and transform its total heat and power generation from high carbon to low carbon production. In 2006 only 15 percent of the fuel used was biomass and 85 percent was fossil. In 2011 biomass had increased to 29 percent. The CO₂ emission from Dong Energy production was 638 g/kWh in 2006. The emissions decreased to 485 g/kWh in 2011. The goal for 2020 is 320 g/kWh reducing to 100 g/kWh in 2040.

Apart from coal and biomass at Avedøre, Dong Energy have other plants that use biomass. In Herning Dong have a power plant that uses 300 000 tonnes of wood chips and 70 000 tonnes of wood pellets per year. In Måbjerg it is a waste-to-energy plant that uses 100 000 tonnes of MSW along with 20 000 tonnes of wood chips and 15 000 tonnes of straw annually.

Increase and reduce

The plan is to increase biomass to 50 percent by 2020 and to 85 percent by 2040. The CO₂ reduction will be possible through both an

increase of the share of biomass and a total reduction in the amount of fuel used.

In 2006 Dong Energy used almost 40 TWh of biomass and coal as fuel, 1 million tonnes of biomass and 6 million tonnes of coal. In 2010 biomass had increased to 1.3 million tonnes and coal decreased to 4 million tonnes. In 2016 the goal is to use 2.6 million tonnes of biomass and only 1.8 million tonnes of coal. The emissions of CO₂ will from 2006 to 2016 fall from 18 million tonnes per year to 5 million tonnes per year.

Pending conversions

This transformation will be achieved through conversion to 100 percent biomass in three of Dong Energy’s plants. Dong has a coal-fired unit in Asneassværket

and one in Kundby, and some smaller power plants that use gas in the Copenhagen area, but these are currently not being converted.

– We have a lot of solar and wind installations and we are connected both to the German power grid and the Nordic market. Renewable power from wind and solar is increasing in capacity, so we shall only be where they are not. This means that we are also closing down power plants, said Niels Christian Kjaer.

The three plants with conversion plans are;

- Studsrupsværket which has two coal-fired units totaling 714 MW; conversion to pellets,
- Skærbækværket, a 392 MW gas-fired unit; conversion to woodchips,
- Avedøreværket Unit one, 250 MW coal/oil-fired plant.

If this becomes a reality then Avedøre would probably become the world’s largest and most efficient biomass CHP plant.

*Text & photos: Anders Haaker
BI74/4432/AS*

FACTS

Electrical efficiency at Avedøre

	Unit 1 (coal)	Unit 2 (biomass)
Electricity only	42 %	49 %
Condenser loss	50 %	44 %
Other losses	8 %	7 %
Co-production	91 %	92 %
Electricity	36 %	42 %
District heating	55 %	50 %
Condenser loss	1 %	1 %
Other losses	8 %	7 %

Innovative bioenergy solutions under development by Dong Energy

Inbicon - 2nd-generation bioethanol production based on agricultural waste products.

Renescience - Enzyme-based separation of household waste to flexible and efficient energy production.

Pyroneer - Low temperature gasification of household waste to flexible and efficient energy production.

B&W Vølund to build 280 MW Dong Energy plant

In July it was revealed that Danish boiler manufacturing firm Babcock & Wilcox Vølund A/S (B&W Vølund), a wholly owned subsidiary of U.S. based Babcock & Wilcox Power Generation Group, Inc., was awarded the contract for Dong Energy’s Skær-

bækværket biomass build. Worth over US\$80 million B&W Vølund is to build a double 140 MW thermal biomass boiler system for the combined heat and power (CHP) plant.

Located near Fredericia, Denmark the 280 MW plant will use

wood chips and other biomass residues. B&W Vølund’s scope of supply consists of the design, manufacture, supply, construction and commissioning of the boiler system. The plant is scheduled for completion in April 2017.

– This project reflects B&W’s

ongoing strategic effort to deploy its clean energy, biomass and waste-to-energy technologies globally, said J. Randall Data, President and CEO of Babcock & Wilcox Power Generation Group, in a statement.

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THE WORLD'S BEST ENERGY SYSTEM

The district energy system serving the Swedish city of Falun is the best in the world according to the International District Energy Association (IDEA) and Euro Heat and Power.

THE MUNICIPALITY-OWNED DISTRICT ENERGY, waste management and water utility, Falu Energi & Vatten AB (FEV), was presented last year with the prestigious "Award of Excellence-Municipal Scheme serving more than 10 000 Citizens-Modernization" by the IDEA at its annual Global District Energy Award gala. Falun has around 56 000 inhabitants

The heart of the FEV energy system is its Västermalmsverket combined heat and power plant. The plant has an installed capacity of 130 MW thermal and 18 MW electric and consists of two biomass boilers, two oil and two gas boilers for start, peak and backup. The plant uses locally sourced forest and wood industry residues to produce around 300 GWh heat and 60 GWh of electricity per annum. The energy system also includes a gas-fired CHP that uses sewage gas from a wastewater treatment plant as well as three wind turbines and five hydropower stations.

Pellet production too

What makes the Västermalmsverket unique is the integration of a 45 000 tonne-per-year wood pellet plant in 2011. Using district heat from the CHP for the drying the pellet plant operates from March through to October when the demand for district heating is low. The pellet plant uses sawdust sourced from several large sawmills in the region but it is also configured to be able to use small diameter roundwood and logging residues as feedstock. The pellets are primarily used in other boilers operated by the company.

– This enables more efficient usage of the CHP during the warmer season and enables us to store energy in the wood pellets to be used during the colder period. In 2012 we used over 16 GWh of district heating in the pellet plant which meant we could produce 4 GWh more electricity, explained Bengt Gustafsson, CEO of Falun Energy & Vatten AB.



Photo: FEV

Network expansion

The FEV district heating network is 180 km in total including three smaller local networks. To further improve CHP production the network is being expanded another 18.4 km to connect with the district heating network of neighbouring city Borlänge. Due to be commissioned this autumn the 117 million SEK network-connect project is in partnership with another municipality owned utility, Borlänge Energi. Borlänge Energi operate a waste-fueled CHP plant as well as use waste heat from paper and steel industries for its district heat production.

The network connection has a heat transfer capacity of 30 MW heat and is expected to transit 120 GWh of energy annually between the cities with a temperature loss of only 1 °C. The companies will have joint production optimisation with the direction of the water flow determined by which fuel is most profitable to use. The companies have shared the project costs equally and the collaboration between the two is expected to result in further advantages involving staff as well as maintenance and purchasing.

FACTS

Network:

180 km c. 2 500 properties
- over 90 % in urban areas
- over 50 % of households
- 2.6 million sq.m of buildings/facilities

Climate impact:

20g CO₂e/kWh

Fuel:

99 % biomass (wood chips, bark, logging residues, sawdust & pellets),
1 % landfill gas and liquefied gas

Editor's note: The FEV pellet plant was featured in no. 6/2011 (54).

*Text Alan Sherrard
B174/4549/AS*

Pécs, first with biomass heat

Last November Dalkia Energia, the Hungarian subsidiary of French energy service provider Dalkia, officially launched its straw-fired combined heat and power (CHP) unit at its Pannonpower plant outside the city of Pécs, southwest Hungary. The new 70 MW thermal 35 MW electric unit replaces fossil gas and together with a previously installed wood-chip-fired boiler, the new unit has made Pécs the first city in Hungary with a district heating system entirely fueled by biomass. With a population of about 160 000 the district heat network serves 31 000 flats and 450 institutions as well as some industries. The new straw CHP unit will use about 240 000 tonnes of straw, some maize (corn) stalk as well as energy cane sourced in the region.

– This new unit is the first power plant in the Central and Eastern European region that generates heat and electricity together using straw as fuel. It clearly proves that using biomass in district heating is a profitable and advanta-

geous opportunity for all stakeholders involved. The biomass technology may be used by smaller district heating systems as well. The direction we started through the use of local biomass in Pécs can lead towards a sustainable and affordable district heating sector in Hungary, said Renaud Capris, CEO, Dalkia Energia at the official launch.

Originally commissioned in 1959 as a coal-fired station the plant was converted in 2004 to use gas and woody biomass. It is the sole supplier of district heat to Pécs. The total value of investment is EUR 80 million (HUF 24 billion).

By replacing the gas-fired boilers the new unit saves about 80 million m³ of fossil gas imports annually and reduces CO₂ emissions by 150 000 tonnes a year. According to data from the Hungarian Energy and Public Utility Regulatory Authority the plant now accounts for almost 20 percent of Hungary's renewable electricity production.

*Text: Alan Sherrard
B114550/AS*

EDF, VEOLIA CLOSE DEAL

French energy firms EDF and Veolia have completed the transaction associated with the agreement signed in March related to their joint subsidiary Dalkia. EDF has acquired all of Dalkia Group activities in France, under Dalkia's brand, while Dalkia's international operations are taken by Veolia. Announced in October 2013, it was subject to competition authorities approval which was given at the end of June 2014.

*www.dalkia.fr
B114551/AS*



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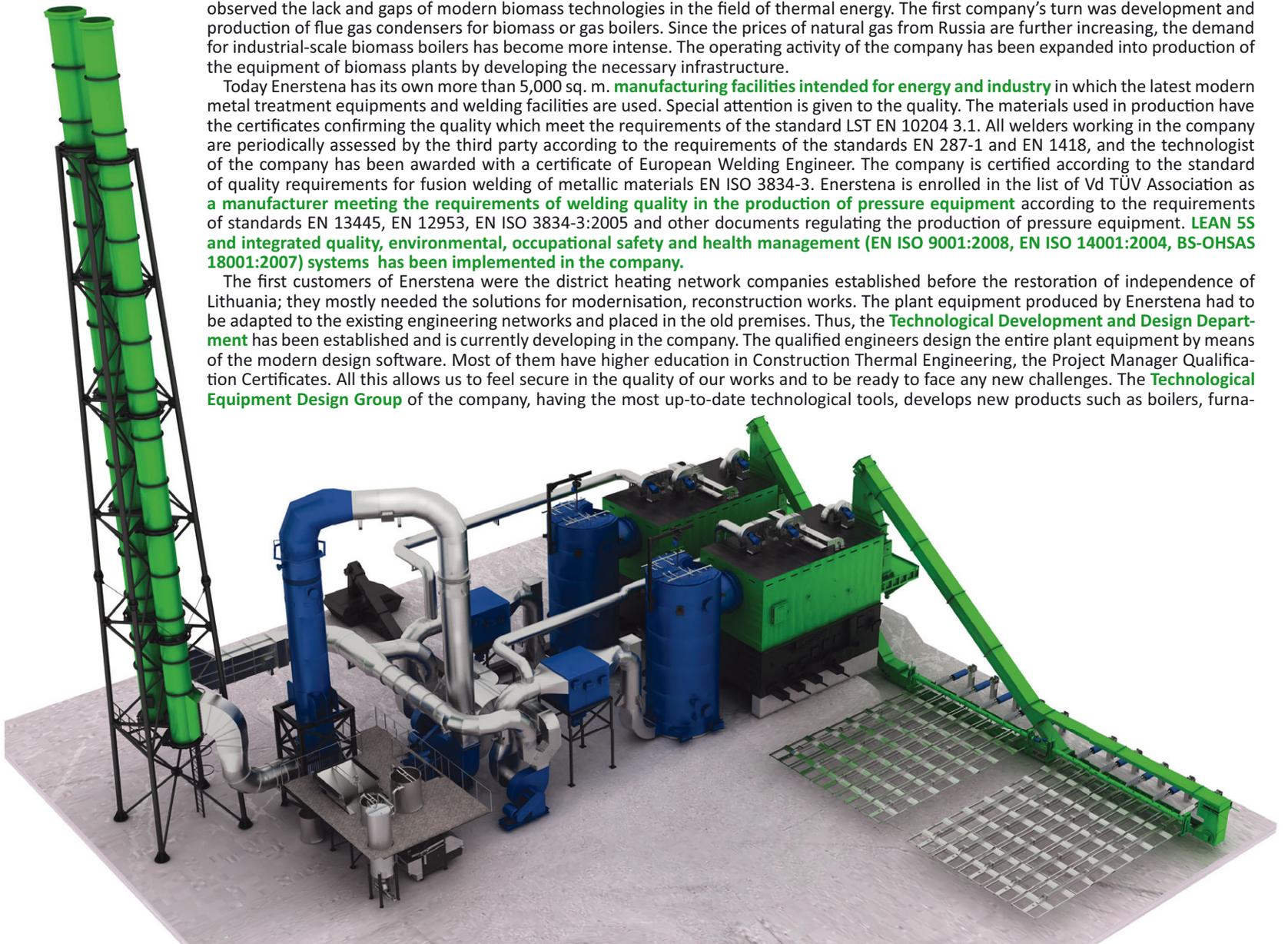
THE COMPANY ESTABLISHED BY TWO ACTIVE ENGINEERING STUDENTS HAS BECOME THE LEADER OF THE INNOVATIONS IN THE THERMAL ENERGY SECTOR WITHIN A PERIOD OF ONLY 12 YEARS. TODAY IT WORKS WITH A PLENTY OF CUSTOMERS IN LITHUANIA, EUROPE AS WELL AS IN OTHER MARKETS.

The history of industrial biomass use in Lithuania started in 1994-1995 when the first wood chips and sawdust plants appeared as a result of the financial support granted by the governments of Sweden and Denmark. In addition, interest in use of such fuel was gradually increasing in Lithuania. This industrial field has entrenched in the district heating system, covering approximately three quarters of the Lithuanian residents, as a result of increasing prices of oil and natural gas. Today, more than 30% of heat in the district heating system is generated from biomass, mainly, wood waste. It is provided in the national program of use of renewable energy sources that the part of renewable resources in the district heating supply should be increased up to 50-60%. Thus, the further expansion of biomass plants and power plants is planned.

The company Enerstena was established in 2002 by two perspective and thrusting students who had completed the university studies in the field of thermal engineering. At the beginning, the company performed installation and construction works in the field of energy until it observed the lack and gaps of modern biomass technologies in the field of thermal energy. The first company's turn was development and production of flue gas condensers for biomass or gas boilers. Since the prices of natural gas from Russia are further increasing, the demand for industrial-scale biomass boilers has become more intense. The operating activity of the company has been expanded into production of the equipment of biomass plants by developing the necessary infrastructure.

Today Enerstena has its own more than 5,000 sq. m. **manufacturing facilities intended for energy and industry** in which the latest modern metal treatment equipments and welding facilities are used. Special attention is given to the quality. The materials used in production have the certificates confirming the quality which meet the requirements of the standard LST EN 10204 3.1. All welders working in the company are periodically assessed by the third party according to the requirements of the standards EN 287-1 and EN 1418, and the technologist of the company has been awarded with a certificate of European Welding Engineer. The company is certified according to the standard of quality requirements for fusion welding of metallic materials EN ISO 3834-3. Enerstena is enrolled in the list of Vd TÜV Association as **a manufacturer meeting the requirements of welding quality in the production of pressure equipment** according to the requirements of standards EN 13445, EN 12953, EN ISO 3834-3:2005 and other documents regulating the production of pressure equipment. **LEAN 5S and integrated quality, environmental, occupational safety and health management (EN ISO 9001:2008, EN ISO 14001:2004, BS-OHSAS 18001:2007) systems has been implemented in the company.**

The first customers of Enerstena were the district heating network companies established before the restoration of independence of Lithuania; they mostly needed the solutions for modernisation, reconstruction works. The plant equipment produced by Enerstena had to be adapted to the existing engineering networks and placed in the old premises. Thus, the **Technological Development and Design Department** has been established and is currently developing in the company. The qualified engineers design the entire plant equipment by means of the modern design software. Most of them have higher education in Construction Thermal Engineering, the Project Manager Qualification Certificates. All this allows us to feel secure in the quality of our works and to be ready to face any new challenges. The **Technological Equipment Design Group** of the company, having the most up-to-date technological tools, develops new products such as boilers, furna-





ces, flue gas condensers, flue gas stacks and many other products, therefore we have the opportunity to take into consideration even very individual customer needs such as equipment parameters, arrangement, composition, fit of equipment into the premises of the customer.

During the recent years, Enerstena has implemented a particularly large number of projects related to modernisation of plants by replacing fossil fuel with biomass. But the biomass supplied to the plants contains a lot of pollutants, ground; humidity of such biomass is high. This was the reason for establishment of the new, particularly important functional unit of Enerstena, i.e. the **Centre of Science and Research**, in which the research on combustion of specific fuel and preparation of combustion technologies are carried out, operation of the equipments produced and operated by Enerstena is analyzed, and works of digital modelling of equipments are performed.

Enerstena offers to its customers the biomass plants intended for preparation of high and low pressure steam and hot water which may be adapted to various industrial processes and district heating supply networks according to the needs of the customer. Equipment control is fully automated; the additional workers are not necessary during its operation. **The equipments are designed to burn wet fuel (its humidity may reach 55%).**

Increasing prices of gas impel the enterprises to look for the alternative fuels. We are always happy to help reduce production energy costs not only to the heating suppliers but also manufacturing industrial enterprises. **Enerstena has manufactured and installed the first steam boiler in Lithuania** (capacity 14 t/h, operating pressure 20 bar, temperature of steam 230°C). Steam boiler has a biomass furnace. The steam produced by this boiler is used in production process by paper company Grigiškės. This company with over one and a half hundred years experience in paper and wood industry is well known in Lithuania as the market leader. Other projects implemented by Enerstena and manufacturing industrial enterprises are the following: the steam plant of 9 MW (14 t/h) of Vičiūnai Company Group, one of the largest and economically strong manufacturers of crab sticks as well as *surimi* and fish products in Europe; the new biomass plant with 10 MW (15 t/h) steam boiler with dry-type flue gas condenser was con-

structed for one of the largest and the most modern milk production enterprises Žemaitijos pienas.

After being appreciated by many Lithuanian enterprises for the completed works, Enerstena expands geography of its customers: Currently two biomass boilers, 12 MW each, are in manufacturing process for the French company Leroux & Lotz Technologies; a flue gas condenser for the existing biomass boilers of 26 MW was manufactured and installed for the Latvian enterprise Ventspils siltums; boilers of total 5 MW (2 MW + 3 MW) were manufactured and installed for the Latvian enterprise Naujenes Pakalpojumu Serviss; the negotiations are in progress regarding signing of contracts with other foreign companies. **We see that our products and services are in request in foreign countries: Manufacturers flexible to customer needs and producing good quality and inexpensive products are in demand.** The equipment manufactured by Enerstena is certified in the European Union, Belarus and Russia.

Thermal efficiency of boilers manufactured by us reaches 88-90 %; electric energy consumption usually is lower than 10 kWh to produce 1 MWh of heat. Structure of flue gas condensers causes the minimum aerodynamic and hydrodynamic resistance and electric energy consumption. The achieved difference between temperatures of incoming water and the flue gas condenser's outgoing fumes does not exceed 2°C.

All boilers (both steam and hot water) manufactured by Enerstena have the automatic systems for cleaning of heating surfaces. The systems are quite effective: a boiler operates up to 6-10 months without shutdown to do cleaning. Other measure to increase the annual efficiency rates of biomass boilers and to ensure protection from CO emissions is as follows: all boilers exceeding 5 MW have equipment for remote measurement and control of O₂ and CO concentrations. Few stages of fuel burning in furnace are operated, therefore concentration of NO_x does not exceed 160-240 mg/m³, and CO concentration usually does not exceed 10-100 mg/m³.

We created the control systems for processes of boilers and flue gas condensers for ensures automatic operation of equipment. As the control applications are created by us, we can adjust them according to individual needs of the customers. At the customer's request we monitor parameters of



equipment from the control panel in our company. The company has a service division which immediately and twenty four hours a day provides technical support to our customers during a warranty and after warranty period.

We are sure that our long time experience, know-how and modern technologies in energy sector will allow us to do considerable works. We have growth and development potential as well as potential to contribute to expansion of district heating system and solution of national and global ecological issues. **Our highly experienced specialists carry out the works from idea to key:** begins from analysis of situation of heating system of the customer and preparation of ideas and technical solutions beneficial to the customer and ends with design, development, manufacturing, installation and commissioning of the equipment. All responsibility lies with us.

U.S. HOUSING RECOVERY SET TO STRESS TEST PELLET SECTOR

In recent years the North American pellet sector has experienced impressive growth in terms of production and production capacity. Much of this growth has come in the aftermath of the economic crisis, a time of radically lower demand for raw materials from competing product lines. With the U.S. economy in recovery the housing sector will pick-up raising several relevant questions for the pellet sector as the wood industry consultancy firm Timwood highlights.

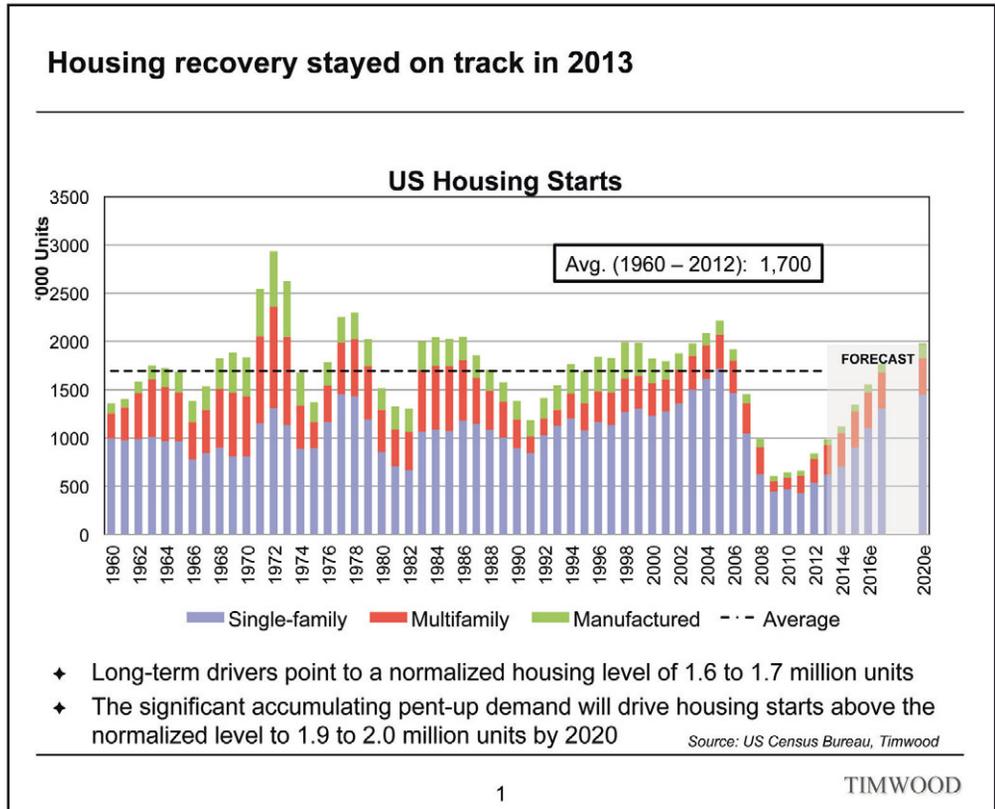
ACCORDING TO THE U.S. ENERGY Information Administration (EIA), U.S pellet exports almost doubled last year. From just over 1.45 million tonnes in 2012 to 2.9 million tonnes in 2013 and with short-term forecasts predicting continued growth. There is no doubt that the North American pellet sector today plays a crucial part in fulfilling European pellet demand, but as the pellet industry expands its presence within the greater forest products industry, new issues will emerge.

This increase in raw material availability for pellet production has partly been the result of a drop in the construction sector and thus housing starts. From a historically high level of more than 2 million units in 2005, housing starts fell to a level of nearly 600 000 units in 2009. Furthermore, this historically low level in housing starts has been more or less maintained in the years that have followed. As European pellet demand increased and a favorable feedstock situation developed, the North American pellet sector has, since the crisis, started being very successful in their development work, led in particular by the U.S. South region.

As the U.S. economy recovers so will the housing sector. The turning point has already occurred and the housing market is experiencing positive growth. Forecasts predict a housing start level in the range of 1.6-1.7 million units in a couple of years, in the long-term perspective a rather normal level. A recovery in the housing market will lead to an increased appetite for fiber among the traditional forest products sectors, including Oriented Strand Board (OSB). This raises several relevant questions for the pellet sector, not just for producers but also consumers.

How has the OSB industry developed in the US South in the past and what can we expect in the years to come?

Driven by the local forest resource and a regional housing demand that accounts for over half the



total U.S. demand, the OSB industry in the U.S. South has experienced rapid growth, in excess of 300 percent, over the past two decades. It has become the dominant OSB producing region, today accounting for more than 50 percent of the total North American capacity.

The weakness in the American housing market has slowed down OSB production, negatively impacting capacity utilization in the region. In 2013 the U.S. South's production of OSB utilized just two-thirds of installed capacity. Prior to the housing downturn the average capacity utilization rate in the U.S. South was in excess of 90 percent.

In the years to come, with a recovery in the U.S. housing and construction sector, OSB production in the U.S. South could increase by some 45 percent, if capacity utilization rates return to normal levels near 90 percent and announced capacity additions are built. This level of increased production would require an additional 6-7 million m³ of raw material inputs.

How will the supply of fiber available for pellet production be affected?

Paying capabilities of key consumers of wood fiber differ. Pellets usually have a lower paying capability than products like composite panels, OSB and pulp, as wood pellets are a comparably low-value product.

Despite the expected increased production in

the OSB and some other traditional forest product sectors, fiber supply is still strong in the U.S. South region due to increasing growth rates and stocking levels as well as structural changes in the region's pulp sectors. The transition of timberland ownership in the U.S. South from integrated forest products companies to investors such as pension funds and endowments, has often resulted in the expanded usage of intensive forest management practices, increasing the region's sustainable harvest level. Additionally, the weak construction market in the U.S. has led to several years of low harvest levels, well below that of growth. This has resulted in an increase in the stocking level and the region's overall harvest potential. At the same time the pulp industry's demand for raw material has diminished as the industry deals with global competition and decreased domestic demand for some paper products.

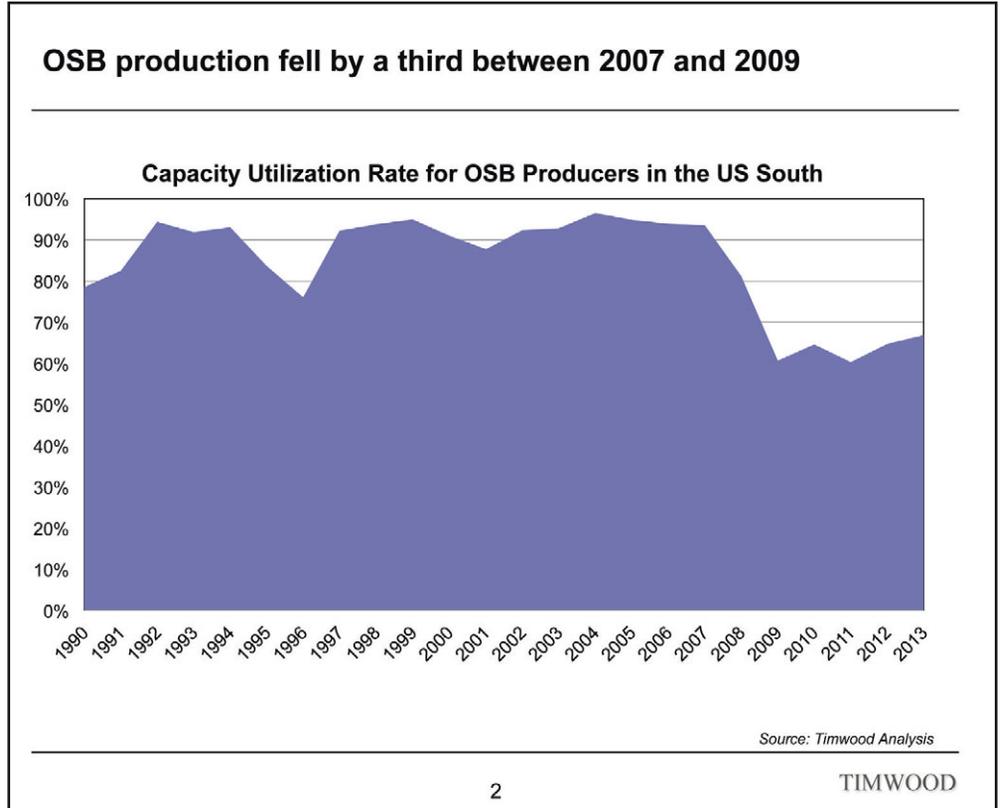
However, a fact that should be stressed is that a large share of pellet production capacity in the U.S. South has been put in place during an economic downturn. Of course producers that have forecasted future supply and availability of fiber based upon a robust housing recovery and the increased demand for fiber from traditional consumers as well as internal competition from additional pellet mills will of course be better situated when the economy improves. Distance to competing board mills, and the overall industry structure of the board industry in respective sup-

ply areas are highly relevant factors to assess individually. It is likely that some of the new pellet mills will suffer more than others in the years to come due to higher fiber prices. As a result the expansion of pellet capacity in the region may be dampened in the years to come.

Effects expected in Europe?

Europe is today the biggest global market for pellets, with limited signs of a significant rise in North American demand and as of yet a relatively slow development in Asian markets. This makes Europe the most important market for many North American producers. A rise in cost for raw material in the U.S. South and thus pellet production cost, as an effect of the housing recovery, should not be overlooked. The U.S. South's role as a "low-cost supply region" may not be as clear-cut anymore.

Faced with rising costs, producers may also seek to increase or maintain their margins by expanding the width of their customer portfolios. In recent years we have already started to see a convergence of the main customer segments; residential, mid-scale/commercial and industrial. Producers, which by tradition have mainly supplied the industrial segment, have now increased their focus on other segments as well. However, a transition to serving new segments, such as the European residential market, brings with it new challenges from product form requirements to distribution. Different, and sometimes even stricter, product requirements can include everything from the standards on pellet metrics to softer values such as colour, delivery methods (e.g. bags vs. bulk) and associated services. An expansion into new segments may well result in a more complex supply chain for North American producers as the gap between producer and



final user increases. Delivery costs vary widely between different markets and thus potential competitiveness in respective markets. Assessments of these new market requirements are crucial to a successful transition into these "new" segments.

Some North American producers may look for partnership opportunities to bridge the gap to the European consumer, providing local firms with the opportunity to leverage their market knowledge, brands, and distributions systems. In the future the optimal supply solution for pel-

lets will likely vary by market and consist of a blend of different supply sources based on competitive positioning. In the event that the U.S. South loses its cost competitiveness in raw material for pellet feedstock, other global regions are likely to gain importance as pellet suppliers to the European markets as well. Timwood will comment on this topic in the next issue of Bioenergy International.

Authors: Hampus Mörner, Doug Simon, Lars-Göran Sandberg

B174/4489/AS

ROUND THE CLOCK PRODUCTION

One of Malaysia's largest biomass pellet producers Citatah Nikkhsin Biomass MSIA Sdn Bhd, reports production at full capacity. According to Nishanth PT, co-owner of Citatah Nikkhsin Biomass MSIA Sdn. Bhd. and Nikkhsin Agro Sdn. Bhd., the plant is running 23/7 as the demand for biomass fuels in South East Asia has risen sharply.

– Having a geographically strategic location fit for anything and everything in between the east and west of the world, Malaysia has fast become the centre of attention for biomass and alternative boiler fuel users, noted Nishanth PT.

Located near Port Klang in Selangor, Citatah Nikkhsin has a 75 000 tonne-per-annum wood

pellet plant and storage for 5 000 tonnes of biomass. The plant uses sawdust and wood residues collected from wood processing companies in the central and east coast region.

– Just seven years ago when I started producing pellets from green waste and wood waste, raw material availability was the main driving force for expansion. There was the lack of a price structure for the biomass as suppliers of this biomass did not value it but instead saw a way of reducing their waste disposal overheads, said Nishanth.

The plant now has four pellet lines each with a capacity of 2.5 tonnes per hour. Two were supplied by Huashen, and the other two by Jining Tiannong (Xuhou Orient).

Growing local demand

The majority of the pellets are exported in containers to power plants in South Korea with over 400 tonnes being shipped out each week. However Nishanth sees a growing interest from local industrial boiler users who are looking at the cost effectiveness of burning local biomass. This is driving new players into the industry.

– This may be seen as a potential threat to feedstock supply control, I see it as a market force that will drive current players into focusing more on quality and better business practices to meet the growing entry partners to the industry.

Residue streams from the wood industry today seem to feed the many wood pellet plants well.



Residues from the palm oil sector on the other hand are still abundantly available for more boilers to utilise it as fuel as well as new players to enter into the industry as processors and suppliers, said Nishanth.

Text & photo: Xinyi Shen
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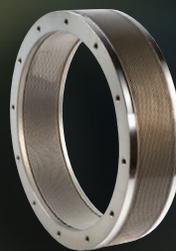
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Groupe Archimbaud commission second pellet plant

2014 marks 40 years of wood pellets in France. It is appropriate that the commissioning of phase one of Groupe Archimbaud's 160 000 tonne-per-annum Pellet Land plant in Labouheyre, Aquitaine will bring the French annual pellet production capacity past the 1 million tonne mark.

IT WAS BACK IN 1974 when a number of people involved with pelleting for the agricultural sector began to experiment with wood. In 1981 Sica Grasasa opened the first dedicated wood pellet plant in Sante-Sabine-en-Born and in 2008 there were 50 pellet producers. By the end of 2012 this had grown to 100 producers with a combined annual production capacity close to 800 000 tonnes.

With this in mind though, one cannot help but wonder why it has taken so long for an industrial scale pellet plant to be set up in Aquitaine in the heart of Landes, southwest France. It is not for lack of resources being located in one of the largest plantation forests in Europe, it is not for lack of projects, it is not for lack of major investors in the timber industry within the region. Whatever the reason, that has now all changed with the Groupe Archimbaud Labouheyre plant.

Softwood processor

With an annual production of around 200 000 m³ sawnwood, Groupe Archimbaud is one of the largest softwood sawmill companies in France. A family-run business, it operates three sawmills and two pallet production plants on four sites as well as a forestry division. Since 1984 the company is specialised in producing sawnwood for the pallet and packaging industry.

According to Jean-Pascal Archimbaud the owner of the company, there is a constant need to find ways of optimising the value and use of residues such as bark, sawdust and woodchips from production. In 2007 the company set up a 120 000 tonne-per-annum pellet plant at its Secondigné-sur-Belle



Following the process flow (1) fresh oversized materials is put through a Diffenbacher grinder, (2) heat for the SwissCombi belt-dryer is produced in one of two Vyncke biomass boilers (3). The dry feedstock is put through one of three Promill-Stolz (4) pelleting lines, another three lines are planned. The pellets are either sent to bulk storage or to a B & C (5) bagging line to be put into 15 kg bags which are then (6) palletised by a Newtec unit.

sawmill in Deux-Sevres. This plant is ENplus certified.

Two-phase project

The Labouheyre project is the second pellet plant for the company and it is being built in two phases adjacent to its sawmill and pallet factory. When fully completed the Labouheyre, "Pellet Land" plant will have a total annual capacity of 160 000 tonnes. The newly commissioned phase one has three Promill 5 tonne-per-hour (tph) presses with a total capacity of 80 000 tonnes per year.

Phase two involves adding an additional three Promill 5-tph presses as soon as possible since most of the plant has already been scaled to accommodate this capacity. Promill Stolz is a French pelleting technology company with installations around the world. It is estimated that around 70 percent of pellet production in France is through a Promill press.

The heat for the drying operations is sourced from two biomass boilers both from Belgium fabricator Vyncke. Together these will cover the thermal capacity needed for 160 000 tonnes pellet production. The first is a 5 MW hot water

boiler and is already operational. The second heat source is 8 MW post-turbine heat from a 15 MW thermal and 3.5 MWe combined heat and power (CHP) plant currently being developed by another company, Cogéland and scheduled to be operational before the end of the year. Both boilers are equipped with Scheuch particulate filters, an electrostatic precipitator for the smaller boiler and a baghouse for the larger one, to ensure emissions are under the 30 mg/Nm³ threshold.

Local materials

The incoming raw material consists of own sawdust, woodchips as well as off-cuts from pallet production along with sawdust and woodchips from other wood processing industries nearby. Off-cuts and woodchips pass through a Diffenbacher grinder before being conveyed to a pre-dryer storage silo. The conveying systems at the plant were supplied by French company Sera-Bois. From the storage silo fresh material goes through a SwissCombi belt-dryer which utilises the heat from the boilers, low temperature heat from the hot water boiler for the pre-drying zone and the high

temperature heat from the CHP plant when it comes online.

The dry material is then conveyed to another building which houses the pelleting, conditioning and packaging processes. The entire building is ATEX compliant with dust removal, aspiration and Firefly spark detection systems supplied by Berthold Technologies. Special anti-friction plastic conveyors are used to transport pellets hot off the press to the Promill cooler before being directed to either a 15 kg bag via a B & C bagging line and Newtec Bag Palletising unit or the bulk silo.

Groupe Archimbaud have chosen not to market their pellets directly to end customers but instead work with via regional distributors such as Euro Energies and Woodstock who sell the 6 mm pellets both in bulk and bagged under their own brands, "Crépito" and "Woodstock", respectively.

Text & photos: Frederick Douard, Bioénergie Promotion

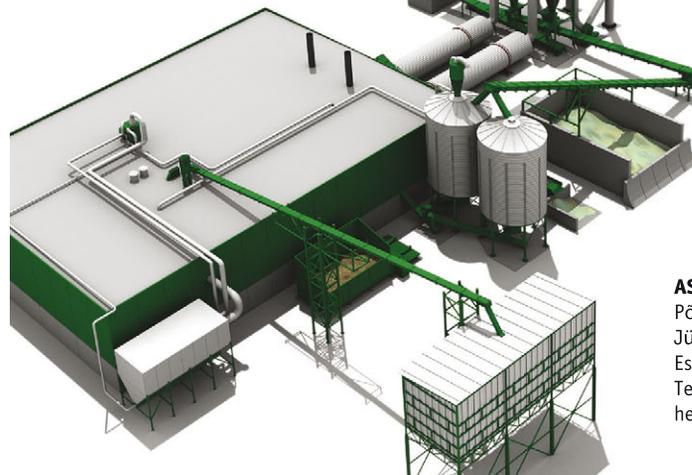
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Transforming palm waste into value-added biomass fuels



– EFB's are tough to pelletise, ring dies need replacing after 1 200 hours, said Md Arfizar Md Ariffin, Executive Director, Detik Aturan.

With 39 percent of global production, Malaysia is the world's second largest palm oil producer. Of an estimated 168 million tonnes of biomass residues generated annually, around 94 percent is from the palm oil sector. The company Detik Aturan Sdn Bhd is one of a growing number of pioneers producing biomass pellets using empty fruit bunches (EFB) as feedstock. It operates the largest EFB pellet plant in Kuala Selangor with more to follow.

ACCORDING TO THE MALAYSIAN PALM OIL Board (MPOB) Malaysia has just over 5.2 million hectares (2013) of land currently under oil palm cultivation, about 16 percent of the country's land area. The palm oil industry generates an abundant amount of by-products, the tending, maintenance and restocking of the plantations and especially from palm oil processing.

With over 400 palm oil mills in Malaysia, the industry generated around 80 million dry tonnes of biomass in 2010. The sector alone accounts for about 94 percent of annual biomass residue arisings with the remaining contributors being agricultural and forest industry by-products, such as wood residues (4 percent), rice

(1 percent) and the sugarcane industry (1 percent).

From compost to pellets

The Detik Aturan story started in 2005 with agricultural waste management, processing and converting agricultural waste into compost. In 2009, when the open burning of agricultural waste became a hot topic, Detik Aturan wanted to find a faster way to convert residues into revenues. Biomass densification and use as a coal substitute for the power sector like in Europe seemed a promising path to follow.

Detik Aturan has been entrusted by the government of Malaysia under the *Pemodenan Per-*

tanian (agricultural modernisation) programme to launch a pilot project to add value to agricultural waste by transformation into solid fuel pellets and briquettes. In collaboration with Uniten's (Universiti Tenaga Nasional) Centre for Renewable Energy, various biomass residue sources available in Malaysia were collected and pelletised with combustion and firing tests on these pellets to determine which had a commercialisation potential.

In 2010, Detik Aturan began commercial activities and, as rice straw is a seasonal residue, the company had to look elsewhere for a less seasonal and more abundantly available source of biomass. Empty fruit bunches (EFB) is such a residue and comes from the stripping of oil palm fruits in the oil extraction process at the mill. EFB's have about 30 percent solid content of which about 2/3 are fibrous and the remaining 1/3 are soft parenchyma tissues which cement the fiber together.

– We found that the most abundant biomass source in Malaysia was from oil palm and conducted some research with EFB's. There were other pellet mills back then, but they were small-scale, producing something like 300 tonnes per month, and they used mainly sawdust. Back then no-one knew what the characteristics of EFBs were, so we had a tough time. They are very difficult to pelletise, said Md Arfizar Md Ariffin, Executive Director of Detik Aturan.

EFB pilot project

The first EFB pellet plant was setup as a pilot in Tanjung Karang, Kuala Selangor District about 60 km from Port Klang, Malaysia's largest port. It opened in April 2012 and receives roughly 1 000 tonnes of EFB fiber from nearby palm oil mills every month. The EFB's are already pressed into 5-10 cm size as a result of the palm oil processing stage, but still contain 45-50 percent moisture. Before feeding into the pelletiser the moisture needs to be brought down to 20 percent and the size milled down to 1 cm. One tonne of raw EFB fiber can produce about 450 kg of pellets.

– The pelleting system with three pellet presses were bought from a Chinese manufacturer. However these could not pelletise EFB from the very beginning. We worked very hard with local engineers to find solutions and modified the whole system. Now each press can reach 1.5-2.5 tonne per hour production capacity and run 16-20 hours per day. The ring die should be replaced every 1 000-1 200 hours, Arfizar said.

Export to Korea

In 2012 South Korea adopted the Renewable

The EFB pellets are cooled and sieved before packaging using a rotary sieve.



Portfolio Standard (RPS) which requires state-run and private power utilities with capacity in excess of 500 MW to generate 4 percent of energy from renewable sources by 2015, increasing to 10 percent by 2022. As most are coal fired, co-firing with biomass is the preferred option and major power utilities have equipped plants for co-firing with wood pellets.

In order to meet the RPS mandate, the South Korean government has set a target to import 5 million tonnes of pellets by 2020, thus meeting almost 75 percent of the anticipated demand. Energy and trading companies such as GS, LG and Samsung are all actively exploring pellet import opportunities with suppliers from Australia, Canada, USA and South East Asia (Malaysia, Indonesia, Vietnam, and Thailand). However, South Korea has had a regulation against the import of oil palm biomass, which was categorised as waste.

– Two years ago, we worked with our local South Korean partner, and when the power plants there tested our EFB pellets and saw the potential to reduce the consumption of wood pellets, they campaigned to their government to review the law, explained Arfizal.

100 000 tonnes per month

In December 2013, the South Korean government allowed EFB pellets to enter the country. According to Arfizal the utilities viewed EFB pellets as a market alternative for wood pellets especially as they were facing an increase in the price of such pellets from Canada and the US. Almost all of the EFB pellets will be for the export market for places like South Korea, Japan and Europe.

South Korean power firms have asked Detik Aturan for a commitment of 100 000 tonnes of pellets per month but current output is at 5 000 tonnes per month. Detik

Aturan has committed that it would provide 10 000 tonnes per month during 2014 and by the end of 2015 will ship 100 000 tonnes per month. So now Detik Aturan is working with various plantations and investors and the plan is to build another five to ten factories over the next one and half years.

– In Terengganu, we are building the pellet plant inside a palm oil mill, and it will collect all the biomass from the surrounding mills. We’re working with the Chinese company Zhengchang to manufacture the pelletising machine with special modifications for EFB pellets. The monthly capacity is aimed to reach 2 000 tonnes. Another 10 000 tonnes-per-month plant is planned to set up in Sabah in cooperation with Palm Oil Industrial Cluster (POIC), said Arfizal.

Gasifying EFB pellets

In a separate project the company is collaborating with a Malaysian researcher in Germany to design an EFB pellet for gasification purposes. Ash analysis of EFB’s show it has more potassium and sodium and less silica, calcium, iron, and aluminum than wood and coal. The high potassium content in EFB negatively affects the ash melting point causing sintering at high combustion temperatures.

Recent experiments using a Ca(OH)₂ additive in the EFB feedstock have revealed promising results demonstrating that EFB pellets could possibly be used as a gasification fuel to provide a producer gas for heat and/or power. With extensive research and work, Detik Aturan is confident to introduce EFB fiber and biomass pellets to the market as a great alternative source for renewable energy.

*Text & photos:
Xinyi Shen
B174/4491/AS*



Being a stringy fibrous material, EFB is a challenging feedstock to pelletise even after grinding down to 1 cm particle size.



The EFB pellets are packed into 700 kg big bags and shipped in 25 tonne containers to clients in South Korea from Port Klang, Malaysia’s largest port. Five such containers are sent every three days. Shipping takes 10 days.

PHI Group signs MoU’s for JV pellet plants in Vietnam

The U.S. based PHI Group Inc., a company focused on energy and natural resources, has signed Memoranda of Understanding (MoU) with two Vietnam-based wood processing companies to set up joint venture (JV) wood pellet plants in Central and Southern Vietnam.

Both wood processing companies have been in operation since the early 2000’s and have access to large, sustainable quality sources of raw materials for wood pellet manufacturing. According to a statement the initial proposed combined capacities for the JV pellet plants are scheduled for 400 000 tonnes per annum. PHI Group intends to own a minimum of 51 percent equity interest in each of the contemplated JV enterprises.

*www.phigroupinc.com
B174/4371/AS*

Aviation and biofuels (part one)

2014 marks a century of scheduled commercial aviation. In 2008 the industry committed itself to aggressive goals capping net carbon dioxide (CO₂) emissions from 2020 and to have cut net CO₂ emissions in half by 2050 compared to 2005. Getting environmentally and economically sustainable aviation biofuels out of the conference room and into airplanes is critical if this is to be achieved. The collective "buzz" on the ground seems to suggest that it might just fly.

THE FIRST SCHEDULED COMMERCIAL AVIATION flight is reported to have taken place 1 January 1914 with a single passenger who was taken on a 23-minute journey across Tampa Bay, Florida, USA. In 2008, almost a century later, the aviation industry committed itself to what was touted by the sector as the world's first set of sector-specific climate change targets. Coordinated by the Air Transport Action Group (ATAG), a not-for-profit organisation that represents all sectors of the air transport industry, the aviation industry has agreed to; continually improve fleet fuel efficiency by 1.5 percent per year from 2009 to 2020, cap net carbon dioxide (CO₂) emissions from 2020 while maintaining continued industry growth, and finally halve net CO₂ emissions by 2050 compared to a 2005 baseline, which equates to 325 million tonnes. Airlines and stakeholders across the sector are collaborating to reduce emissions by using a four-pillar strategy consisting of new technology, efficient operations, improved infrastructure and finally market-based measures to fill the remaining emissions gaps. These were the first such global targets for any industrial sector and lead to an agreement by governments, through the International Civil Aviation Organisation (ICAO) in October last year, to develop the global market-based measure for aviation, for approval at its next assembly in 2016.

Two percent of global CO₂

The task is daunting. ATAG numbers reveal that there are almost 1 400 commercial airlines which operate over 25 300 aircraft on close to 50 000 routes serving over 3 800 airports. In addition there are over 41 800 general aviation and military airfields scattered around the world. In June 2014, the most recent forecast was made by the International Air Transport Association (IATA), which represents around 240 commercial airlines that collectively account for 84 percent of global air traffic. 2014 will see some 33.8 million scheduled passenger flights carry 3.32 billion passengers and 51.7 million tonnes of freight. Whereas a decade ago 23.8 million scheduled flights carried 2.06 billion passengers and 36.8 million tonnes of freight.

In terms of aviation fuel consumption and CO₂ emissions the numbers are big too. In 2004 some 65 billion gallons of aviation fuel, about 247 billion litres or 199 million tonnes, was consumed and 619 million tonnes of CO₂ emitted.

IATA's forecast for 2014 is 76 billion gallons of aviation fuel, about 289 billion litres or 233 million tonnes, will be used and 722 million tonnes CO₂ released. In reality it is higher as some commercial as well as non-civil and military aviation is not included in these numbers.

Put into perspective air transport accounts for about two percent of global anthropogenic CO₂ emissions. Furthermore its relative contribution has not increased over the past two decades and is not expected to go beyond three percent by 2050. Aviation accounts for 12 percent of all CO₂ emissions within the transport sector whereas road transport has a 74 percent share. It should be pointed out that concerns have been raised about other aircraft-specific exhaust emissions such as nitrogen oxides (NO_x), sulphur oxides (SO_x), particles and water vapour and their effect on the climate. A recent paper "Valuing the non-CO₂ climate impacts of aviation" by Azar & Johansson suggests that if one looks at the temperature increase that a flight taken today causes in one hundred years, the total contribution of both CO₂ and these non-CO₂ emissions is about 10 percent higher than if only CO₂ is taken into consideration.

Fuel efficiency

Given the inherent difficulty in getting, implementing and enforcing international "market-based measures" and the 4.7 percent average annual global growth projected by ATAG during 2012 to 2032, one may be forgiven for being somewhat skeptical. In fairness to the aviation industry though, it seems already to be delivering on its first target; to continue to improve fleet fuel efficiency by 1.5 percent per year from 2009 until 2020. IATA figures reveal that the industry has generally become more efficient over the period 2004 to 2014. Both weight load and passenger load factors have increased, the former by 5 percent, to just over 66 percent and the latter by almost 7 percent, to just over 80 percent. This translates into a decrease in fuel consumption per passenger and per freight tonne-kilometer.

Winglets, riblets and lightweight cabin furnishings as well as production upgrades made by aircraft and engine manufacturers do all add up but also take time. IATA estimates that fully implemented, the combined total impact of these short-term fuel and efficiency measures is 15-29 percent CO₂ reduction compared to the



Tony Tyler Director General and CEO of International Air Transportation Association (IATA).

2005 baseline. New aircraft and engine designs have the potential for significant further reductions but lie in the future, post 2020.

Infrastructure inefficiencies

With the airline and aircraft industry apparently on track and delivering its planned changes to achieve its 2020 fuel efficiency target, it would seem that the immediate problem is both political and commercial. An example of the former is airspace and airport inefficiencies, which are not insignificant. The Intergovernmental Panel on Climate Change (IPCC) estimates that up to 12 percent of the aviation industry's CO₂ emissions are attributed to such inefficiencies. The Civil Aviation Navigation Services Organisation (CANSO) estimate that about 4 percent emission reduction has been achieved by addressing airspace issues since 1999. Be that as it may, initiatives such as Single European Sky (SES) and U.S. NextGen Air Transport System would contribute to further emission reduction by avoidance, but are contingent on governments and air navigation service providers, around 173 such providers globally, delivering on their commitments.

Another issue highlighted by ATAG and IATA that is also contingent on global agreement and enactment, given the international nature of aviation, is the global coordinated approach to aviation emissions. A global CO₂ emission standard for all aircraft types as well as a single cost-effectively administered global market-based measure (MBM) is needed. Airlines ought to be held accountable once for their emissions without market distortion or overlaps. A single measure is preferable over a myriad of national or regional measures, the attempt to bring aviation into the European Emissions Trading Scheme (EU-ETS) being a case in point. Perhaps



With ASTM SIP SPK blendstock approval, Total-Amyris are now supplying a 10-percent blend of its sugarcane-derived biofuel to GOL who, very fittingly, use it on flights between Orlando, Florida and São Paulo.



a single global carbon tax on the fossil component of aviation fuel, which according to the provisions of the 1944 Chicago Convention on International Civil Aviation is currently untaxed, could be such a market-based mechanism.

Technically available

Aviation is a special case within the transport sector. Unlike other modes of transport and carriers on the ground or in water, it has no foreseeable alternative to liquid fuels. Realising battery power technology for aircraft seems still somewhat distant. Though one ought to question the necessity of short-haul flights over other collective forms of transport; according to ATAG around 80 percent of aviation's CO₂ emissions arise from flights longer than 1 500 km for which there is no practical time saving alternative. Interestingly ATAG also point out that air transportation carries around 0.5 percent of globally traded goods by volume but 35 percent of globally traded goods by value.

Although conventional vegetable oil methyl esters or fatty acid methyl ester (FAME) biodiesel blends readily with fossil diesel fuel or jet fuel, it is not a "drop-in" fuel and unsuitable for use in aviation. Obviously, alternative fuels have to meet the same technical specifications as conventional aviation fuel, especially cold properties and energy content, as well as be drop-in and blendable within the existing aviation fuel infrastructure. No-one wants to run the risk of dropping out of the air due to bunged fuel and this is of course why there are standards.

However, technical specifications are no longer the problem. At least 10 airlines and several airplane manufacturers carried out technical test flights with up to 50 percent biofuel blends during 2008 to 2011, confirming the

technical performance of these alternative fuels. Since 2011, when the American Society for Testing and Materials (ASTM) approved HEFA blendstocks – currently the most widely available alternative fuel types – over 1 500 scheduled commercial passenger flights have taken place. These have used blends of up to 50 percent biofuel derived from feedstocks as diverse as used cooking oil (UCO), algae, jatropha and camelina and have been carried by 19 or so airlines. Recent examples include KLM Royal Dutch Airlines and aircraft manufacturer Airbus that started, in mid-May, the first of a series of around 20 long-haul commercial biofuel flights from Amsterdam Schipol airport to the Dutch Caribbean island of Aruba. Using a 20-percent blend of UCO-derived biofuel, the 10-hour flight is the longest commercial flight with sustainable jet fuels performed by an Airbus aircraft. During the recent football World Cup in Brazil, the official airline of the Brazilian team, GOL Airlines used a biofuel blend on around 200 flights carrying the team to cities across the country. GOL used about 90 000 litres of "Honeywell Green Jet Fuel" made from inedible corn oil and UCO supplied by U.S. petrochemical refinery process and technology major UOP, a wholly-owned subsidiary of Honeywell International.

Currently three types of alternative jet fuel, collectively termed "synthesised paraffinic kerosene (SPK) blendstocks", have been approved by the ASTM in its most recent (June 2014) international D7566 "Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons" namely; Fischer-Tropsch (FT SPK), Hydrotreated Esters and Fatty Acids (HEFA SPK) and, just recently, Synthesised Iso-Paraffinic (SIP SPK).

Cost-per-barrel barrier

Admittedly, these 1 500 or so flights are a proverbial drop in the ocean. A major challenge for the wider deployment of alternative aviation fuel is cost since these have, thus far, been significantly more expensive per unit fuel than conventional fuels. Fuel cost has grown to become the single largest operational expense item for airlines. According to IATA, in 2003 fuel costs represented 14 percent of operating expenses with a barrel of Brent crude oil costing US\$28.8. This year fuel costs are expected to represent 30 percent of airline operating expenses with Brent crude at US\$108 per barrel.

A quadrupled cost of crude oil and "only" a doubling of the operating expense percentage in a decade suggests that airlines still in business have managed thus far to combine cost cutting and rationalisation exercises along with fleet renewal and fuel-saving retrofits. That is not to say airlines have been making money. A recent study from the University of Southampton, UK shows that international airfares have decreased by 0.5 percent per annum between 1990 and 2012. Low-cost carrier competition and the financial crisis amongst other things has led to a wave of mergers, bankruptcies and bail-outs keeping operating profit margins, for the most part, well below 5 percent during the 2004 to 2014 period.

Part two in the next issue looks at commercial availability and capacity of alternative aviation fuel.

Text: Alan Sherrard

B174/4546/AS



Full-scale ethanol from straw

Two full-size factories for cellulosic ethanol will be up and running this autumn in the U.S. Midwest. POET's factory in Emmetsburg, Iowa, and Abengoa's factory in Hugoton, Kansas. Bioenergy International made short stops at both factories this summer.

BOTH FACTORIES WILL USE cellulosic corn residues, but Abengoa will use straw from wheat and sorghum as well. They will both have a capacity to produce 25 million gallons of ethanol, about 100 000 m³.

There is one major difference: the factory in Emmetsburg is added on to an existing conventional corn ethanol plant, making this plant a combined first- and second-generation ethanol biorefinery. The plant in Hugoton is a new, stand-alone unit, only producing second-generation cellulosic ethanol.

In this issue of Bioenergy International we present the factory in Emmetsburg and the next issue looks at Hugoton.

Emmetsburg/POET Not only POET's plant

It is in fact incorrect to call the Emmetsburg plant a POET plant. Located at the POET premises, the project, called "Project Liberty" is a joint venture between POET and Dutch DSM. The joint company

name is POET-DSM Advanced Biofuels LLC.

Matt Merritt from POET gives us a quick tour of the new factory, which is near to completion.

—The same farmers who deliver their corn to our existing ethanol plant will also deliver their corn residues to the new plant, Matt tells us. We will get 285 000 tonnes of cobs, straw and husks. It will be turned into 25 million gallons of ethanol. At the same time, we will produce steam and biogas and deliver to the old ethanol unit.

This will drastically improve the climate balance of the Emmetsburg biorefinery, and reduce the use of natural gas.

I ask Steve Hartig, General manager of POET-DSM Advanced Biofuels, about the overall carbon balance, but he doesn't give precise numbers:

—The Renewable Fuels Standard (RFS) defines cellulosic ethanol as bringing a 60 percent reduction in greenhouse gas emissions as com-

pared to gasoline. We are significantly better than that. The RFS also indicates that grain-based ethanol needs to be at least 20 percent better than gasoline.



Steve Hartig, General Manager of POET-DSM Advanced Biofuels

The requirements look at the separate pathways – grain or cellulosic material. The Emmetsburg plant will combine the two, and the interesting question is how good the total carbon balance will be for a plant producing ethanol from the whole corn plant, the kernels, cobs, stalks and leaves.

New business opportunities

Major new features over a conventional plant are the supply of feedstock, the handling and preparation of the cellulosic material, and pre-treatment before fermentation. Looking at feedstock:

—The biomass feedstock will be brought from within a 45-mile radius around Emmetsburg. We are right now working on building the market for deliveries. We buy directly from the farmers and not through a supplier. We can also set up the harvest for the farmers, and work with independent contractors.

Matt tells us this is a good new opportunity for rural entrepreneurs, often young people from the farm community, who invest in balers and build new businesses, a much cheaper activity than to start farming and buying land.

Most storage is at the farms, but the factory also has storage; 22 acres with room for three weeks of

factory demand. The bales are piling up.

–We want as much cobs as possible. They are rich in energy, Matt explains.

We take one tonne per acre

There has been a scientific debate lately about using corn residues. Some argue that the straw is needed for soil fertility, and the carbon balance has been questioned.

–We take only 25 percent of the above-ground residues on the harvested fields, or 1 tonne per acre (2.2 tonnes per hectare). The rest is left for the soil.

The corn stover is delivered in round bales. Each bale weighs about 1500 pounds, or 680 kg. Most are taken directly to the biomass building, where the bales are cut up and the plastic net wrap is removed and taken to the solid fuel boilers. POET developed the machine for this step. The bales are sent to grinders, the material is sifted, and then sent to a bunker to be conveyed to the processing area.

Pre-treatment with acid and steam explosion

After shredding, the material goes to the pre-treatment unit. The method used is described as “a dilute acid pre-treatment with steam explosion”. The contractor for this part is Andritz.

–We chose this method after extensive R&D and pilot plant work, as we believe it is the best technology presently available to break down the corn crop residue to a form that can be accessed by our enzymes, explains Steve Hartig.

From pre-treatment the material is taken to the saccharification tanks. Here enzymes are added to complete the conversion from cellulose to sugars.

–Compared to regular corn ethanol production we get more different types of sugars here, explains Matt.

After switching from company Novozymes to DSM, DSM also became a partner, taking 50 percent ownership.

The next step is fermentation. Yeast is added and from here on the process is almost identical to a regular ethanol process, with distillation, purification, drying, etc.

–We anticipate producing 70–80 gallons (280–320 litres) from

each tonne of raw material, says Matt Merritt.

CO² is sent to the scrubber, but not captured or sold as green CO².

–There is no huge market for it, and due to high shipping costs it is typically sold close to an ethanol plant, Steve Hartig explains.

Recovering waste streams

The waste and residues from the process are different from those at a conventional plant. Its material is not as rich in proteins, and cannot be used to produce animal feed. Instead, the solids and liquids are separated in a separate unit with large filter presses.

The solid filter cake goes to the solid fuel boiler to produce steam, used internally in both units. The boiler also uses biomass fines and plastic net wrap recovered at the biomass preparation unit.

The liquid filtrate is taken to an anaerobic digester, to produce biogas (methane) that is used for power production.

With the energy recovery from wastes and residues, the plant can substitute almost all use of natural gas, as well as some of the import of electricity.

There is a flow of waste heat that is not used, but must be taken to coolers. Like most American cities, Emmetsburg does not have a district-heating grid to export to.

What is the company strategy?

We ask Steve Hartig some questions about the strategy of the company:

You chose to add the new factory on to an existing ethanol plant. Is this a strategy you will use in the future, creating hybrid plants?

– Yes. There are significant synergies at the site. We use rail siding and ethanol storage facilities that are already in place. We have a single manager and share some operators and technicians. We can use steam and biogas from the new part to replace fossil energy in the existing plant. We believe in co-location.

What about the economy? In what price range can you produce straw ethanol?

–We expect to be profitable operating this plant, selling ethanol under the US Renewable Fuel Standard legislation. We have targeted significant cost savings for our next plants, our ultimate goal is to be competitive with corn-based ethanol, but that is several years away.

This answer doesn't give a specific number for the expected production cost, but such a number is hardly relevant, as the plant is the first of its kind.

Steve Hartig is, like most people in the US biofuel industry, dissatisfied with the political and regulatory uncertainty surrounding the RFS legislation. He supports the legislation, but right now the EPA (US Environment Protection Agency) is going through a lengthy review of the obligations.

Why did you not decide to make bio-electricity at the plant?

–Given the relatively low cost of electricity in the US it did not make financial sense.

Markets in China, Europe and Brazil

What are POET's plans in this field after you have started the Emmetsburg plant?

–POET DSM plans to licence this technology in the US, to POET and non-POET plants, and globally. We are active in markets such as China, Europe and Brazil. POET and DSM form a joint venture focused on this industry, and we will continue working together.

Based on the experience at Emmetsburg, we can expect POET to make similar investments at other plants. POET has 27 ethanol plants in 7 US states, all of them based on corn, and is the largest US ethanol company.

POET was started by the Broin family in the late 1980s. The company headquarters are in Sioux Falls, South Dakota.

*Text & photos: Kjell Andersson
BI74/4536/JH*



Matt Merritt, POET, in the biomass delivery hall. The round bales contain 1500 pounds of straw each.

FACTS ABOUT US ETHANOL

According to the RFA (Renewable Fuels Association), there are 211 ethanol plants today in the United States. Most of them are located in the Corn Belt in the upper Midwest. Almost all plants use corn as feedstock; a few can also use sorghum.

Second-generation plants are being built or recently opened in Emmetsville, Iowa by POET, in Hugoton, Kansas by Abengoa, in Nevada, Iowa by Dupont, and in Galva, Iowa by Quad County Corn Processors.



Post-demergers, Metso and Valmet both major Finnish suppliers to the global forest products industry participated at PulPaper 2014. The three-day event had some 450 exhibitors and attracted over 9 400 visitors from 72 countries to the Finnish capital Helsinki.



Hendrik de Jongh, MD of Sappi Forests, said in an interview that the "forest products industry" is entering an exciting period of growth and development. These go way beyond Sappi's traditional pulp and paper products, now there is a growing demand for bioenergy, biofuels and interest in carbon trading markets.

PULPAPER 2014: BIO IS THE FUTURE

The 8th PulPaper conference and tradeshow in Helsinki, Finland proved an invigorating three days. Held at the beginning of June the "BioFuture for Mankind" theme debated the global bioeconomy, biorefinery and strategic resource management. From a Finnish pulp and paper industry perspective, it was a most fitting 100th anniversary discussion.

OVER 9 400 VISITORS FROM 72 COUNTRIES AND 450 PLUS EXHIBITORS converged on the Finnish capital Helsinki for the 8th PulPaper conference and tradeshow. Held once every four years PulPaper is organised by the Finnish Paper Engineers Association (PI) together with AEL, a Finnish technical training firm and Adforum, a pulp and paper industry event organiser.

The event clearly showed that many new products and business opportunities exist within the pulp and paper industry after a few years of decline. Very fitting as PI celebrates its 100th anniversary this year. Apart from numerous technical papers on mill operations and related topics, the conference opened a great opportunity to also discuss new forest based products and bioenergy.

Biorefining through cascading

Ed de Jong from the Dutch firm Avantium Chemicals presented his view of a forest biorefinery to serve the chemical industry.

– Biorefining in the form of biocascading, that is co-producing food, feed, bio-based products and bioenergy is the way to go for the large-scale sustainable use of biomass in the future BioEconomy, de Jong underlined.

The forest industry can, according to him, play an important role when it can supply the right feedstock at the right price levels.

– We need a clear international and level playing field for optimal large-scale sustainable biomass production and valorisation, stated Ed de Jong.

Sludge biogas potential

Fredrik Nilsson from Pöry Sweden gave a comprehensive view on biogas production at Thermo Mechanical Pulp (TMP) and Chemical Thermal Mechanical Pulp (CTMP) mills in Sweden.

– Large volumes of wastewater are produced within the Swedish pulp and paper industry. Most of this water is currently treated using activated sludge processes. The resulting sludge is normally dewatered and incinerated or, for a fee, treated and used as filling material, Nilsson said.

According to Nilsson the treatment of wastewater incurs a cost for the mills and does not make use of its potential energy and nutrient content. Another option that could potentially exploit these resources is anaerobic digestion (AD). AD has been implemented and, in some cases, evaluated for the treatment of pulp and paper mill wastewater. The sludge from the aerated process with or without pre-treatment in an upflow anaerobic sludge blanket (UASB) system can then be digested to generate biogas in a completely stirred tank reactor (CSTR).

– The advantages of this treatment strategy include sludge volume reduction by 30-70 percent and the production of biogas, Nilsson explained.

The biogas potential of sludge from wastewater treatment processes at six mills varied considerably. According to Nilsson, the sludge age affects biogas production, as younger sludge has a higher biogas potential, but recirculation within the treatment process may have influenced this result.

Biorefinery strategic

An optimistic Thomas E. Amidon, a paper and bioprocess engineering professor from the State University of New York College of Environmental Science and Forestry, USA, spoke about the future prospects for forest industry biorefineries.

– The biorefinery is a strategic need for our sector. Biomass source attributes and market needs is key to success. Next we need higher value and more complex processes. This means integration with existing industries that can speed up applications. Reconstituted wood products will lead, followed by pulp and paper and make everything even bigger, stated Thomas E. Amidon.

Recently his research team landed a US\$ 150 000 grant to develop a flue-gas based dryer system using waste heat to dry woodchips.

Pyro-oil and torrefaction

Speaking on “Processes for biore-

finery - emphasis on energy production”, Jussi Mäntyniemi, Director of Technology for Valmet Power talked about the LignoCat (Lignocellulosic fuels by Catalytic pyrolysis) project that Fortum, UPM and Valmet have embarked on. The project aims to develop catalytic pyrolysis technology for upgrading bio-oil and commercialise the solution.

– Several studies show pyrolysis technology as the most competitive route to produce advanced lignocellulosic biofuels, and is one of the most efficient routes for meeting the EU 2020 greenhouse gas emission reduction targets, explained Mäntyniemi.

In this project, the consortium aims to develop novel integrated technology to produce high value biofuels to replace fossil transportation fuels, and thereby create new business for the consortium companies.

– We will develop pyrolysis

technology enabling improvement of bio-oil quality compatible for further refining to transportation fuels or intermediate products. This is a business opportunity for us, which will lead to new sustainable processes and products. We see a great potential in this project and look forward to continued cooperation,” said Jussi Mäntyniemi.

Jari Hiltunen from Andritz Torrefaction spoke about improving biomass for special applications including advanced biomass fuels. Amongst several projects he presented the Andritz 1-tonne-per-hour Sdr. Stenderup torrefaction demo plant in Denmark which has been in operation since 2012.

The next edition of PulPaper is slated to take place in 2018 though dates and venue have yet to be announced.

Text & photos: Markku Björkman

B174/4487/AS



– The forest industry can play a big part with the right feedstock and price, said Ed de Jong Avantium Chemicals.



Thomas E. Amidon from SUNY was optimistic on the role of biorefineries.

St1 to supply two waste-to-ethanol plants

The Finnish energy group St1 has recently announced that its subsidiary St1 Biofuels Oy is to deliver its waste-to-ethanol plants to Sweden and Finland. In Sweden its Etanolix® plant is being supplied to North European Oil Trade Oy (NEOT), an oil and biofuel wholesale trading company. It will use biowaste and process residue from local bakeries and bread from shops that is past its sell-by date. Currently under construction at the St1 refinery in Gothenburg it will have an annual production capacity of 5 million litres of bioethanol and be fully integrated into the refinery functions and logistics. Production start-up is expected in early 2015. It is the first biofuel production plant to be owned by NEOT in Sweden.

In Finland St1 Biofuels will supply its Cellunolix® plant to North European Bio Tech Oy (NEB) for its biofuel project in Kajaani. The 10 million litre capacity plant will use sawdust sourced from the region as feedstock and is scheduled to begin production mid-2016. St1 Biofuels Oy will operate the plant with production leased to NEOT.

www.st1.eu

B174/4479/AS

Andritz to supply pre-treatment technology for Fiberight project

International technology suppliers Andritz has received an order to supply pre-treatment equipment, engineering, and field services for Fiberight's cellulosic ethanol plant in Blairstown, Iowa, USA. Start-up is planned for the first quarter of 2015.

The technology utilizes a steam heating concept to continuously preheat and cook the feedstock at elevated temperatures, producing an average of 200 BDMT/d of pretreated material. It will be used for continuous pre-treatment of municipal solid waste which will then be converted into cellulosic ethanol using Fiberight's existing fermentation and distillation processes. Fiberight is a privately held clean technology company and focuses on transforming post-recycled municipal solid wastes and other organic feedstock into renewable biofuels.

www.andritz.com

B174/4524/AS

Stora Enso acquires biotech firm Virdia

The Finnish forest industry major Stora Enso has announced it has acquired in full the U.S. based company Virdia, a developer of extraction and separation technologies for conversion of cellulosic biomass into highly refined sugars and lignin. Virdia runs a pilot facility in Danville, Virginia. According to a statement cost-competitiveness and high purity of the output are key advantages of the acquired technology. This enables a variety of further conversion and upgrading possibilities for sugars and lignin as renewable intermediates for sectors such as specialty chemicals, construction, coatings, personal care and food industries. The acquisition follows a recent lignin extraction investment at Stora Enso's Sunila Mill in Finland.

www.storaenso.com

B174/4510/AS

Quad County first with commercial cellulosic corn ethanol

Recently the U.S. farmer-owned corn ethanol company, Quad County Corn Processors commissioned its bolt-on cellulosic ethanol technology to produce ethanol. In doing so the northwest Iowa firm is the first to begin commercial production of cellulosic ethanol from corn kernel fibre, beating other commercial cellulosic ethanol plant projects such as Abengoa, DuPont Danisco and Poet-DSM in the process. The company invested around US\$9 million into developing and building a “bolt-on” technology adjacent to its existing conventional corn ethanol plant, 35 million gallons per annum in Galva. At full capacity the new unit will convert corn kernel fiber, a by-product from the existing ethanol plant, into 2 million gallons of cellulosic ethanol. The process also improves the protein in its dried distillers grain by 40 percent, and increases corn oil extraction by 300 percent all from the same original amount of corn input. Quad County has closed a deal with Syngenta to market Quad County's technology to other ethanol plants.

www.quad-county.com

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Recapitalization of Bandit Industries

Huron Capital Partners ("Huron Capital") and Bandit Industries have announced that they have entered into a letter of intent to recapitalize Bandit as a private company, and to provide resources and capital to reinforce Bandit's continued record growth while accelerating the company's global growth strategy.

Jerry Morey will continue to run the business as President & CEO. Upon closing the sale, a CEO suc-

cession plan will be initiated to recruit and train a top caliber executive to lead the business into its next phase of growth.

Mike Morey Sr. and Dianne Morey will remain with the company in consulting roles. Bandit will be co-owned by Jerry Morey, Mike Morey, Dianne Morey and Huron Capital. The investment is expected to close in early fall 2014.

www.huroncapital.com

BI74/4555/DN

New Zilkha facility

In July Zilkha Biomass Energy, a producer of biomass solutions to electric utility customers, announced it is building a new Zilkha Black@ Pellet Black facility in Monticello, Arkansas, USA. The company is to invest US\$90 million into making one of its largest facilities though capacity is undisclosed. Zilkha's 275 000 t/yr Selma plant is nearing completion.

www.zilkhabiomass.com

BI74/4511/DN

Eco2 gets go-ahead

Stockton council has granted permission for a new 49 MWe biomass power station in Port Clarence, UK. The £160m project is being financed by Cardiff-based renewable energy specialist Eco2.

The Port Clarence development is the largest type of biomass plant that can be approved at local authority level. The facility will turn 325 000 tonnes of waste wood a year into green energy.

BI74/4502/DN



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Vermeer announce family succession

As part of its family succession planning process, U.S. based Vermeer Corporation announced that third-generation family member, Jason Andringa, will serve as the company's next President & CEO effective Nov. 1, 2015.

On Nov. 1, 2014, Jason will assume the role of President & Chief Operating Officer for one year, before his transition to President & CEO. He currently serves as President of Forage and Environmental

Solutions.

—Gary Vermeer, my grandfather and Vermeer founder, was very influential for me personally and professionally, said Jason Andringa.

—I look forward to working closely with Jason this coming year to prepare him for the transition to CEO in Nov. 2015, said Mary Andringa, current President & CEO and second-generation family member.

B174/4554/DN

First EnviTec plant in the Philippines

In July 2014, German biogas technology suppliers EnviTec Biogas AG signed its first contract in the Philippines.

The planned 6 MW peak load biogas plant in Candelaria, Quezon province, is expected to deliver over 2.4 MWh of green energy after its completion. The customer is First Quenson Biogas Corporation (FQBC), a consortium of local poultry owners.

As early as 2012, the members

of the cooperative had approached Carbon Footprint Solutions Inc., a solution provider and developer for renewable energy projects in the Philippines and South East Asia, to make practical use of the annual accumulation of 22 000 tonnes of poultry dung and 30 000 tonnes of rice and corn straw through a waste-to-energy project.

www.envitec-biogas.com

B174/4528/DN



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First French biogas plant order for BTS

The Italian biogas technology supplier, BTS Biogas Srl, has via its recently established French subsidiary, BTS Biogaz SAS, signed its first contract for a biogas plant in France. The 120 kWe output plant is for a farmer located in Brittany, Western France who intends to use a mixed variety of feedstock, predominantly pig slurry along with chicken manure, straw, grass and maize silage. Commissioning is expected in early 2015.

– The client chose BTS on account of feedstock flexibility and because we can guarantee a complete biological and technical after-sales support. The significance of this order for us is twofold: it's the first plant in France for BTS and it's a plant located in Bretagne, one of the most important farming regions in the country, said Roberto Salmaso, International Sales Manager, BTS Biogaz.

First UK supermarket to go off-grid

The Sainsbury's Cannock store is the first supermarket in the UK to come off the National Grid for day-to-day electricity consumption. Supermarket retailer Sainsbury's has partnered with Biffa, a major waste management company that operates several anaerobic digestion (AD) plants, in an innovative food-waste recycling project.

Food waste unsuitable for charitable donations or animal feed is collected from Sainsbury's supermarkets around the UK using Sainsbury's delivery lorries. It is returned to Biffa's AD plant in Cannock where the biogas is used for power production. Electricity for Sainsbury's Cannock store is directly supplied to the supermarket via a new 1.5 km cable.



BioOpinion: Charlotte Morton - Chief Executive ADBA

With Germany the biogas engine of Europe spluttering on empty, the UK biogas sector seems to be gearing up. Market mechanisms such as Renewable Obligations (ROs), Feed-in Tariffs (FITs), the Renewable Heat Incentive (RHI) and the Renewable Transport Fuel Obligation (RTFO) are in place and hundreds of projects are in the pipeline. According to Charlotte Morton from the Anaerobic Digestion and Biogas Association (ADBA) over 100 new AD plants have come on-line since 2009. In BioOpinion Charlotte gives some background into the British biogas boom.

The figures suggest that the ADBA is successful in fulfilling a facilitating role, can you give a resume into how it all started?

– I should clarify that the figures exclude AD plants found in the water sector of which there are 164 plants. As of May this year there are 147 plants outside the water sector, 32 of which were commissioned during 2013. Furthermore there are over 200 plants with planning permission and, 2014 will be the biggest ever year for new combined heat and power (CHP) and bi methane plants opening.

We are a young organisation, the ADBA itself was established in September 2009 as a not-for-profit trade body to represent the anaerobic digestion (AD) and biogas industry with the aim of facilitating the industry's growth, helping the UK to meet its renewable energy targets and pave the way for a carbon-free future. It was set up by Lord Rupert Redesdale, the former Liberal Democrat energy spokesperson, and ten founder members to try and remove barriers faced by the industry. I joined as its Chief Executive a month later. In 2010 we held our first biogas conference and exhibition at the NEC in Birmingham and have seen tremendous growth and support.

Speaking of growth potential, 1.6 TW electrical capacity equivalent by 2025 based on a total of 137 million wet tonnes of feedstock in your high scenario. Over 60 percent of this feedstock is to come from agriculture?

– We believe it is doable. If all of the plants with planning permission go ahead, we would have around 250 MW of installed capacity. These would use over 16 million wet tonnes of feed-

stock, three million of which are agricultural. Most of the agricultural feedstock in the scenario, 76 million wet tonnes, is farm animal waste and bedding whereas 11 million is crops.

The use of crop feedstock is controversial for those who argue it risks displacing food production. What is your take on that especially given the rapid projected growth?

– At the ADBA we are often asked what role crop feedstocks should play in UK biogas production. As you point out there are those who argue that growing crops for renewable energy production will take away land that could be used to grow food, however current practices and research paint a more diverse and positive picture. As we stand today only nine of the 147 plants are solely using crop feedstock. Statistics from the Department for Environment, Food and Rural Affairs (Defra) show that in 2013, just 15 500 hectares of land was used for growing maize for biogas which is about 0.24 percent of the UK's total croppable area.

One must bear in mind that farmers grow break crops for many reasons: to enhance soil quality; to make the most of contaminated land unsuitable for growing food; supplement less calorific farm waste feedstocks to increase biogas yields; or use AD to diversify their income, and to protect their core farming business from volatile food markets as well as rising energy and fertiliser

prices. That said, where crops are used it is vital that they are grown in a way which integrates into a farm's existing system, encourages environmental benefits and avoids potential problems.

Furthermore under the RHI, sustainability criteria reporting for greenhouse gas (GHG) emissions will become mandatory from April 2015. The GHG criteria will also apply to the RO for plants above 1 MW from April 2015, with land criteria for both schemes also taking effect from this time. Operators will need to demonstrate a 60 percent saving on fossil GHG emissions and all consignments of crop feedstock must meet these limits. As of yet there is no similar deadline for the FIT though it is up for review in 2015, and sustainability criteria could be on the agenda.

Food waste is another topical issue. With a ban on landfill as a disposal means, will we see more cross-sector projects that utilise food waste like the Biffa - Sainsbury's Cannock supermarket?

– We are very encouraged by projects like Sainsbury's Cannock as today only 7 percent of the annual 15 million tonnes of food and drink waste arising in the UK is being sent to AD for treatment. So if we want to realise the full potential of AD in this country, then we cannot ignore one of the largest untapped feedstock streams.

Whilst it is unquestionable that we need to do everything possible to avoid food waste in the first place, not only economically but also from an environmental and indeed moral perspective, it is equally crucial that the remainder is treated by the current most efficient process, which is AD. A ban of food waste going to landfill is definitely one answer. Increasing collaborative cross-sector efforts between AD operators, developers, waste managers, local authorities, food and drink businesses and technology providers who are coming up with a range of solutions to secure food waste streams for AD is another.

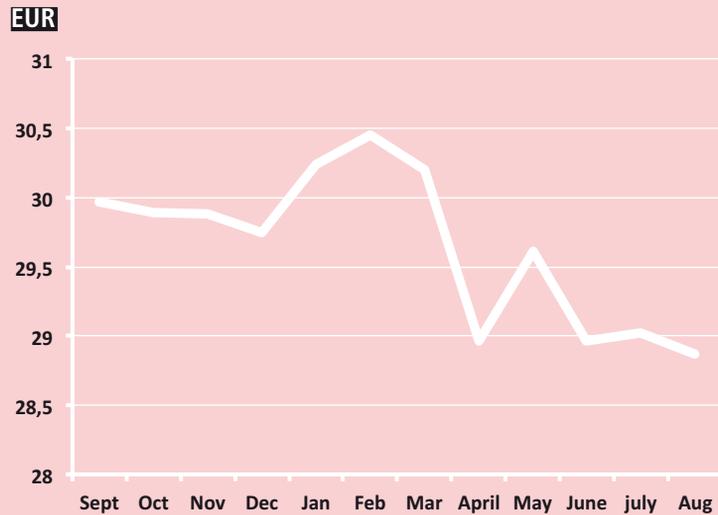
The UK has an extensive gas grid. Is biogas upgrading and injection where a future lies?

– Considering there are currently just four gas to grid injection plants in the UK and another 37 projects in the pipeline, 10-15 of which are scheduled to commission this year, the interest is enormous. The biomethane market is now established and provides an additional opportunity for AD operators and projects. Not just for grid injection but also transportation. By 2030 it is estimated that 20 000 heavy goods vehicles (HGV's) could use biomethane as fuel. That is 10 percent of the current HGV fleet on the road.

*Text & photo: Alan Sherrard
B174/4545/AS*

"One must bear in mind that farmers grow break crops for many reasons"

PELLETS EUR/MWh • September 2013 - August 2014



Pix Pellet Nordic CIF

NO BIG CHANGES ON THE industrial pellet market in the Nordics have been seen. In the UK, the industrial pellet demand future has become a bit clearer as the Department of Energy & Climate Change (DECC) has announced that no budget will be allocated for biomass conversions this autumn in one of their support schemes. Even though this is a bit of a troublesome decision for the energy producers, they are now aware that they need to find support through the Renewables Obligation (RO), another possible route to bioenergy support.

For example, Drax is anyhow expected to proceed with their unit conversion plans even with this latest development. Also on the supply side, Drax goes on with its plans to expand their pellet production, primarily in the U.S. One plant is planned to be built in South Carolina and another one in Mississippi, which would be their second plant there. Drax' total capacity increase plans are up to 2 million tonnes.

Another U.S. producer, Zilkha Biomass Energy, is planning to build a new production facility in Arkansas, for the manufacture their

black pellets on the site. RusForest has announced the sale of its Swedish subsidiary Ystad Pellets AB, a non-core wood pellet plant that has been idle for several years.

During the summer, the pellet business is typically quite stable, but even though July is a rather quiet month in the pellet sector, some both lower and higher prices were reported to us. There were also unchanged prices, as usual.

The Euro (EUR) strengthened by 1.55 percent against the Swedish Crown (SEK) in July compared to the June 2014 average, which meant a downward pressure on the Euro-value and a similar upward impact on the Swedish Crown-value. When calculating the averages, PIX Pellet Nordic benchmark went down in Euro-terms by 0.15 EUR/MWh, or by 0.52 percent, and closed at 28.87 EUR/MWh. In SEK, the pellet index value rose to 266.55 SEK, i.e. moved up by 2.71 SEK, or by 1.03 percent, from the previous month's value.

www.foex.fi

18 August

BI74I4552/DN

Note: PIX Pellet Nordic CIF focuses on industrial pellets use in the Nordic and Baltic Sea region. The index is based on the previous month's data and published the 3rd Tuesday of every month at 12 noon GMT+2. For price conversion between price per ton and price per MWh, a coefficient of 4.8 is used, if not otherwise informed by the price provider.

Note: The PIX indexes are trade mark registered, worldwide, by FOEX Indexes Ltd. Using the PIX indexes commercially is subject to approval by FOEX Indexes Ltd, the owner of the PIX index trademark.

STATISTICS

RHI biomass heating installations pass 1 GW capacity milestone

Installed capacity of solid biomass heating systems under the Renewable Heat Incentive (RHI) in the UK have passed the 1 GW milestone. New statistics show that the UK is on track to achieve its 2020 renewable heat target.

FOLLOWING A POLITICAL campaign in 2008, led by the Renewable Energy Association (REA) and Friends of the Earth (FoE) an environmental NGO, the RHI was launched in late 2011 to drive uptake of renewable heating systems in public and private sector applications. The scheme was expanded this spring to include more technologies and domestic installations.

According to the public RHI report database at the Office of Gas and Electricity Markets (Ofgem), there are over 4 900 solid biomass installations with a combined installed capacity in excess of 1 GW accredited under the non-domestic RHI. The installations are typically businesses and organisations, such as farms, factories, care homes, hotels and churches.

– 1 GW of wood heating under the RHI is a major breakthrough. Our industry is growing fast, from boiler manufacturers and installers to fuel producers and distributors. We want that growth to be both successful and sustainable. As well as stability in the RHI, we also need to do more work on upskilling system installers and developing widely accepted installation standards for all boiler sizes. This is crucial for ensuring that as the industry grows, it maintains a solid reputation for excellent customer satisfaction, commented Julian Morgan-Jones, Interim Chairman of the Wood Heat Association (WHA), a new affiliated trade

body of REA launched in May.

Heat target on track

According to figures released by the Department of Energy and Climate Change (DECC) at the end of July, 2.8 percent of UK heating was supplied by renewables in 2013, up 0.5 percent from 2.3 percent in 2011 when the RHI was launched. 55 percent of the renewable heat generated in 2013 was from wood burning, with a further 20 percent from plant-based biomass such as straw, energy crops, paper and packaging. Furthermore renewable heat generation grew by 19 percent between 2012 and 2013, suggesting the government is on track for the 18 percent average annual growth rate required between 2012 and 2020 to achieve its indicative 2020 target of 12 percent renewable heat, as well as the binding 2020 target of 15 percent overall renewable energy.

A PwC analysis published in April by the REA found that wood heating accounted for 56 percent of investment and over 90 percent of renewable heat generation between 2010 and 2012. It also found that of all the forms of low carbon heating or power generation with significant UK growth potential, 1 MW or larger wood heating is the cheapest in terms of financial support from government.

Text: Alan Sherrard

BI74I4532/AS

Irish bioenergy plan approved

The Minister for Communications, Energy and Natural Resources, Pat Rabbitte TD, and the Minister for Natural Resources, Fergus O'Dowd TD, have announced government approval of a national Bioenergy Plan. It outlines the context for developing the Irish bioenergy sector and the state of play with regard to policy areas that must be coordinated. It also identifies the next steps to support the sustainable realisation of the economic potential of Ireland's bioenergy resources.

www.dcenr.gov.ie

BI74I4525/AS

Biomass Thermal Energy Council Update



IN JUNE, A GROUP OF bipartisan legislators introduced the POWER Act of 2014 in the House of Representatives (H.R. 4916). The POWER Act would further incentivize renewable energy in the U.S. with a focus on combined heat and power (CHP) and waste heat to power (WHP). This bill increases the Investment Tax Credit (ITC) for CHP from a rate of 10 percent to 30 percent and adds WHP as a qualified source of renewable fuel under Section 48 of the Internal Revenue Code.

The ITC was created to foster the development and use of renewable fuels. It currently applies to solar, wind, and fuel cell technologies at a rate of 30 percent and to

geothermal, microturbine, and CHP technologies at a rate of 10 percent. Biomass is not a qualified source; however, it is covered by the ITC if it fuels CHP systems. The ITC will expire on December 31, 2016, but the POWER Act would extend it through the end of 2018.

Since its enactment in 2006, the ITC has contributed to huge growth in the renewable energy industry and BTEC is supportive of this bill since the goal of the POWER Act is to bring parity to CHP and WHP, two thermal sources commonly overlooked and underutilized in the U.S.

EPact revision

Congress is also considering the

addition of “new thermal” to the list of qualified renewable energy sources under the Energy Power Act (EPAct) of 2005. The EPAct mandated emissions reductions and established incentives for renewable energy and energy efficiency. The law also set standards for upgrading federal facilities to renewable and efficient energy production.

In the original law, thermal was not listed as a renewable energy source, but BTEC has joined with other groups to push for the inclusion of thermal. “New thermal” means any thermal coming online following its addition to the Act as a covered source of energy. Passage of the provision would open up op-

portunities for both biomass thermal equipment vendors and generators of thermal energy.

For example, a federal facility would receive credit for installing a biomass boiler for its onsite heat and power needs, whereas before it received no such recognition. Conversely, a federal facility could buy thermal “credits” from an off-site biomass thermal producer, and those credits could be applied towards the facility’s mandate. Support for the addition of “new thermal” is widespread and legislation is expected to be introduced soon.

www.biomassthermal.org

Justine Huetteman, BTEC Policy Fellow
BI74/4540/AS

ABC welcome new multi-agency biogas roadmap

The U.S. Department of Agriculture (USDA) has published a biogas roadmap outlining how another 11 000 biogas plants could convert waste into energy and reduce emissions. – A large step forward to remove obstacles, says the American Biogas Council (ABC).

ON AUGUST 1 THE WHITE HOUSE released the “Biogas Opportunities Roadmap” highlighting the economic and environmental benefits of biogas. A result of cross-agency collaboration between the U.S. Department of Agriculture (USDA), Department of Energy (DOE) and Environmental Protection Agency (EPA), the Biogas Roadmap is part of Obama’s Climate Action Plan and the Administration’s strategy to reduce methane emissions.

According to the EPA, methane emissions account for nearly 9 percent of man-made greenhouse gas (GHG) emissions in the country and the strategy aims to cut methane emissions arising from landfills, coal mines, agriculture and the oil and gas sector.

Over 2 000 biogas sites are operational in the U.S. and the Roadmap highlights that with proper support, over 11 000 additional systems could be deployed. According to industry experts, building 11 000 new systems would provide at least US\$33 billion in capital expenditures for construction activity generating about 275 000 short-term jobs and 18 000 permanent jobs to run the plants.

– Federal Agency commitments

in the Biogas Roadmap will boost industry efforts already underway to grow the U.S. biogas sector. Biogas technologies are commercially proven but certain policies, plus a lack of awareness and recognition of biogas system benefits, limit industry growth. The activities outlined in the Roadmap, when properly executed, will take a large step forward to remove obstacles currently limiting construction of new biogas systems, said Patrick Serfass, Executive Director of the American Biogas Council in a statement.

According to a recent study by the Innovation Center for U.S. Dairy, the dairy sector alone could create US\$3 billion in products from biogas systems. The dairy industry set a goal in 2008 to reduce its supply chain GHG emissions by 25 percent by 2020.

Some of the key steps detailed in the Biogas Roadmap include:

- Promoting biogas utilisation in the U.S. via existing USDA, DOE and EPA programmes ensuring that criteria for technical and financial assistance considers the benefits of biogas systems and strengthen programmes that support biogas use for clean energy,

transportation, renewable chemicals and biobased products.

- Fostering investment: USDA will seek to improve the collection and analysis of industry financial and technical data needed to track plant performance, evaluate loan and grant programmes, and review Federal procurement guidelines to ensure eligibility of biogas system products for applicable government procurement programmes.

- Strengthen markets for biogas systems and products: The USDA, DOE and EPA will review opportunities to overcome barriers to integrating biogas into electricity and biomethane markets and help industry broaden market development for energy and non-energy biogas systems products.

- Improving communication and coordination by setting up a Working Group with participation from USDA, DOE, EPA, and the dairy and biogas industries to monitor progress, identify and prioritise policies and technology opportunities to expand the biogas industry and reduce GHG.

Editor’s note the Biogas Roadmap is available on www.epa.gov

*Text: Alan Sherrard
BI74/4547/AS*

EC adopts higher recycling rate proposals

On July 2 the European Commission (EC) adopted legislative proposals to turn Europe into a more circular economy and boost recycling in the Member States (MS). The plans ask Europeans to recycle 70 percent of municipal waste and 80 percent of packaging waste by 2030, and ban burying recyclable waste in landfill as of 2025. A target is also included for reducing marine litter along with food waste and tailor-made approaches will be implemented for specific waste streams.

The legislative proposals, which refer mainly to the Waste Framework Directive, the Landfill Directive and the Packaging and Packaging Waste Directive, will now pass to the Council and the European Parliament (EP).

– We are living with linear economic systems inherited from the 19th Century in a 21st Century world. Moving to a circular economy is not only possible, it is profitable, but that does not mean it will happen without the right policies, said Environment Commissioner Janez Potočnik in a statement.

www.europa.eu
BI74/4513/AS

EU AND GERMANY REACH DEAL ON REVISED EEG, A CHALLENGE FOR BIOGAS



– The German EEG has served as a template for other countries. This “U-turn” in biogas policy sends a very bad and confusing signal, said Dr. Jan Stambasky, EBA President (right) seen with EBA policy advisor Susanna Litmanen.

On June 27 the German Parliament approved the amended Renewable Energy Sources Act (EEG) and on July 9 the European Commission (EC) reached an agreement with Germany ensuring that the revised legislation is compatible with EU state aid rules. The amendment, in force since August 1, has been strongly criticised by the biogas sector.

THE EUROPEAN COMPETITION Commissioner Joaquin Almunia has examined the revised EEG legislation rules on concerns that it may give some companies unfair competitive advantage. Under the agreement reached between the EC and Germany, an estimated 350 German companies will have to repay a total of 30 million EUR of support discounts previously granted. EU state aid ruling allows the EC to request Member State (MS) governments to recover funds paid to companies if such payments are in breach of state aid or competition rules.

The EC has also accepted a pledge by Germany to allow foreign renewable electricity producers into planned green energy auctions from 2017. Furthermore Germany will be permitted to allow industrial companies who produce their own energy discounts of up to 40 percent on renewable surcharges until the end of 2017.

Bad for biogas?

Not all renewable energy sectors are happy with the new German EEG amendments. According to the new rules, biogas production

will be capped from August 1 to 100 MW annually and Feed-in Tariffs (FiT) will gradually be withdrawn from all new plants above 100 kW. Remuneration categories for certain feedstocks, including agricultural residues, will be removed as well as the bonus for upgrading biogas to biomethane.

– The new EEG is a step backwards for the German “Energiewende”. Federal Minister Sigmar Gabriel has ignored all the warnings of the scientific experts as well as his coalition partners and is holding back bioenergy on the basis of a short-sighted and wrong cost discussion, rather than to fully utilise their valuable properties, said Horst Silk, President of the German Biogas Association, (Fachverbandes Biogas e.V) in a statement.

Dr. Jan Stambasky, President of the European Biogas Association (EBA), warned that this “U-turn” in German biogas policy will risk stopping the already weakening growth of biogas in the country thus missing an opportunity to reduce dependence on imported natural gas. According to Stambasky,

today’s biogas production in Germany corresponds to around one fifth of its Russian gas import.

– The German decision makers seemed to have completely ignored the contribution of biogas to the long-term climate targets and energy independence. The whole of Europe looks carefully at the German EEG that has served as a template for other countries. This change sends a very bad and confusing signal, commented Stambasky. He added that Germany is a world leader for biogas science, technology and know-how and Stambasky is concerned that the new conditions will effectively hinder any further project development in the country.

Switch to heat and transport

It seems Stambasky *et al* have good reason for these concerns. According to the most recent German Energy Agency (Deutsche Energie-Agentur GmbH, DENA) biannual biomethane industry barometer published in July, there are 151 biomethane plants currently feeding into the German natural gas grid, an increase of 21 plants since the last survey in November 2013.

However DENA point out that fuel for electricity generation in combined heat and power (CHP) plants is still the largest market for biomethane. As the EEG reform will result in less favourable conditions for this, plant builders, planners, biomethane generators and traders are intensifying their sales activities in the heat and transportation fuel markets, as well as overseas. Indeed the DENA survey found that biomethane export marketing increased considerably. Overseas sales are now the third-largest use option for biomethane, highlighting the industry’s efforts to overcome problems on the German market by entering new markets.

The DENA survey highlights that the removal of feedstock remuneration classes for certain raw materials and the upgrading bonus for biomethane will reduce EEG remuneration for power generation

from biomethane by up to 40 percent. As a result, calculating, implementing and refinancing biogas-to-grid projects via the EEG market will become far more difficult.

The DENA survey also notes that in terms of mass and energy share, maize (corn) is still the dominant feedstock used for biomethane production. In recent years though the feedstock used has become increasingly diversified. A trend likely to continue primarily because of the 60 percent maize cap for plants from 2012 onwards, along with a voluntary switch to alternative feedstock.

RWE pulls project plans

A case in point illustrating these concerns and consequences is the announcement on July 17 by German utility major RWE that it is, in essence, withdrawing entirely from the German biogas and biomethane sector as a direct result of the passed amendment. Its subsidiary RWE Innogy has “agreed jointly and amicably” with project partner Naturdünger Münsterland GmbH & Co. KG (NDM) to abandon plans to build and operate a 4.2 MW biogas-to-grid plant in Velen since it “deprives the project of its economic rationale”. The project had also been supported by Westfälisch-Lippischer Landwirtschaftsverband (WLV), the co-operation partner of RWE Innogy in the biogas sector.

Planning and consenting for the plant, which was to use 90 percent manure and 10 percent catch crops to produce biomethane and biofertilizer, was originally to start in autumn 2013. The project partners had postponed the application pending the outcome of the EEG amendment and have now abandoned it altogether. As the new EEG makes similar large-scale biogas projects highly unlikely, all three companies have ended collaboration with “regret being unable to continue with the positive partnership at the present moment in time”.

Best ever UK AD & Biogas



Iain Gordon from power management company Easton's Crouse-Hindspower explaining its "fit and forget" modular online gas analyser technology launched at the show.

Organised by the Anaerobic Digestion and Biogas Association (ADBA), the 5th edition of the two-day UK AD & Biogas in Birmingham was the best ever.

OVER 250 EXHIBITORS, 25 percent of which were new, showcased the entire biogas value chain. Biogas solutions for the food and drinks industry along with food waste treatment were two themes and a notable presence on the expo floor was the number of exhibitors featuring various food waste pre-treatment technologies and equipment; from de-packing and bio-waste separation equipment to sludge dewatering and drying solutions.



Sonja Stiedl and Petra Gerhart from Austrian-based Evonik Fibres with "Sepuran Green" hollow-membrane biogas upgrading technology that is causing a stir worldwide.



Ebbe Hansen, Sales Manager for Haarslev Industries, a Danish manufacturer of processing equipment for the meat and fish industries, reported a busy two-days.

New for this year was the "R&D hub", which proved a success as did the range of seminars and workshops on the expo floor. All in all the event attracted a "record" number of the right visitors at the NEC in Birmingham.

– We've had a great response to the commercial launch of our Archemax advanced AD unit. It is a modular thermophilic digester and our first commercial plant is a 15 kW unit that uses one tonne per day of grass silage. We have 15 or so serious enquiries that we are dealing with, commented Stirling Paatz, Director of NGB Ltd, a UK developer of biogas technology.



Three high performers, Howard Sutton, Dr. Philip Hobbs and Stirling Paatz from NGB Ltd who launched their own developed Archemax thermophilic bio-digester system.

While much focus is on establishing and optimising biogas plants, they are by their very nature hazardous areas.

– Our newest modular gas analyser is designed to meet and exceed the measurement needs of the biogas industry. A simple and safe fit-and-forget solution that enables uptime increase with low cost of ownership, said Iain Gordon, Gas Analysis Product Line Manager with Eaton's Crouse-Hinds, a company with extensive experience in process control instrumentation for hazardous environments including oil and gas.

The next UK AD & Biogas is to be held 1-2 July 2015.

Text & photos: Alan Sherrard B17414496/AS



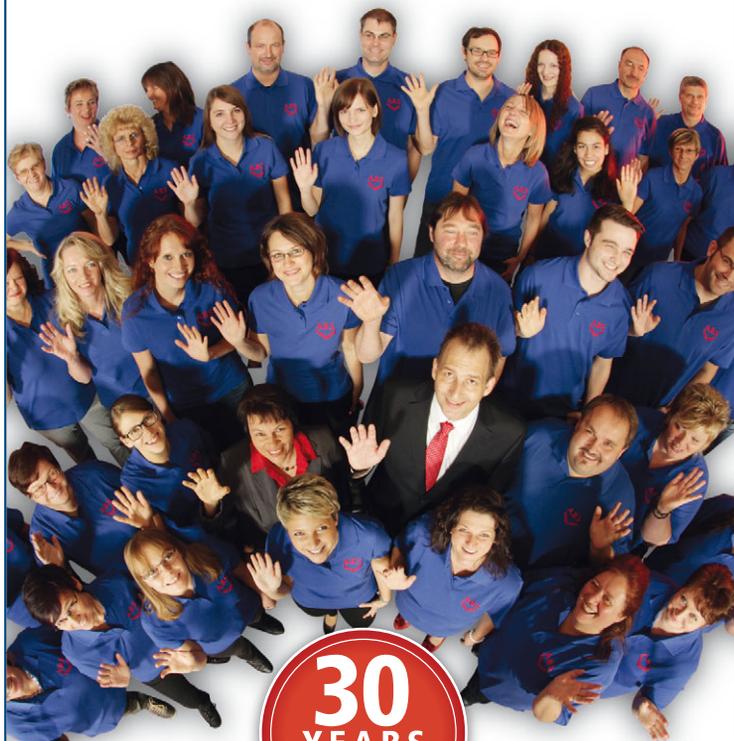
Brian Moore, Managing Director of PRM Waste Systems, listening keenly as a visitor queries the finer details of the Danish dewatering screw compactor on display.



German recycling and biowaste treatment equipment manufacturer Wackerbauer Maschinenbau vividly displayed its separation technology for packaged food waste.



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EU-funded "hedge" biomass project

Hedgerows are a typical landscape feature for a large part of North Western Europe (NWE). For centuries these and other landscape elements had an economic as well as an environmental and social function. Many are under threat. An EU funded project aims to find ways of using biomass from landscape elements on a sustainable and local scale.



Coppicing to preserve a landscape feature in the Netherlands. Labour-intensive and costly-to-maintain unconventional business models are needed to find an economic value for the biomass to support the cultural heritage, social, recreational and environmental benefits. This is what the EU-funded project TWECOM seeks to do.

ANYONE WHO HAS TRAVELLED DOWN AN Irish boleen will have come across the seemingly impenetrable wall of thorn separating the traveller from the field behind. And this is precisely the purpose, keep livestock in the field and trespassers out by demarcating a boundary of ownership. Hedgerows also support a diversity of wildlife from birds and bats to insects, invertebrates and mammals. According to the Irish Heritage Council it is estimated that there are over 400 000 km of native hedgerows in Ireland, some dating back at least a thousand years though most were formed in the 17th and 18th centuries.

However hedgerows and other such landscape features need to be properly managed to function effectively. But many have fallen into a state of disrepair having lost their economic purpose, for example as a source of fuel or material, during the 20th century. Many are vulnerable to complete removal as farming practices continue to change. In 1992 the European Community (EC) adopted the 'Habitats Directive' on the conservation of natural habitats and of wild fauna and flora. Article 10 of the Habitats Directive requires Member States to encourage the management of hedges and other linear features in land use planning and development policies.

TWECOM project

–The best way to preserve something is to give it an economic value. However preserving hedgerows and landscape elements by using subsidies is expensive and not sustainable in the long term. Instead one must find a new economic purpose such as developing a local biomass value chain, explained Bram van Oers from the Dutch

farmers association, Zuidelijke Land- en Tuinbouw Organisatie (ZLTO), at a workshop during World Bioenergy.

ZLTO are partners in an EU project called Towards eco-energetic Communities, TWECOM. The three year project has eight consortium partners, from the Netherlands, Belgium, Germany and the UK. The project seeks to demonstrate that local short chain valorisation of biomass from landscape elements is economically feasible and can generate additional value for the ecological, cultural and social functions of these landscape elements. TWECOM is funded under the INTERREG IVB NWE regional development programme.

Bocholt pilot

Two pilot cases to demonstrate this local biomass value chain are being developed as part of the project, one in Bocholt, Belgium and one in Newbury, UK. The Bocholt pilot is located in a densely populated part of Flanders and has recently completed its value chain. According to Bram van Oers the first challenge was to determine the annual harvestable capacity of hedgerows and landscape features on some 75 km owned or maintained by the municipality. An inventory of trees larger than 10 cm on 16 percent of this distance was made and the annual harvest yield based on a 15-year rotation was found to be 377 tonnes woody biomass at 30 percent moisture content.

At the end of 2013, a cooperative with stakeholders was established and during the 2013/2014 winter an amount of wood was harvested, chipped and dried. In May a heat net-



(Top) The Bocholt pilot recently installed two Fröling woodchip boilers to use hedgerow biomass.

(Above) Bram van Oers from ZLTO sharing experiences during a workshop at World Bioenergy.

work and two 250 kW wood chip boilers at a school campus were installed and test-fired. A hedgerow vision and management plan is also being drafted.

– Having a biomass potential along the roadside is one thing, finding a way to make it accessible and economically viable as a fuel at the furnace is another. This takes calculation, coordination and cooperation. Intentions are fine but figures rule, concluded Bram van Oers.

Another recently completed EU-funded project, the cross-channel Cordiale project between England and France, also demonstrated that hedges can be sustainably and practically managed to produce biomass for combustion at a very competitive unit price.

Further information on these projects can be found on www.twecom.eu and www.cordialeproject.eu

Text: Alan Sherrard

Photos: Courtesy TWECOM

B17414380/AS

Boilers and Burners Directory (300 kW to 1 MW)

As the heating season in the Northern hemisphere approaches now seems a good time to take stock of coming heating needs and possible solutions for the larger residential and commercial sector. The purpose of this Boilers and Burners Directory is to provide an overview and some pointers on who supplies such solid biomass combustion solutions in the 300 kW to 1 MW thermal capacity range. The 52 companies presented below come from different geographical locations, however their international activity has been confirmed by us and the equipment they deliver can be installed in small commercial buildings, farms

and even district heating systems. Several companies from the list have announced an increase in their product range from 150 kW, for example, up to 350 kW or from 3 MW up to 6-8 MW. High competition is probably one of the reasons and driving forces. On the other hand it is natural to continually develop and improve technology year on year. Note only the headquarters of listed companies. The list is derived from our global suppliers database and while it is comprehensive, it is not exhaustive nor does it in anyway represent an endorsement of a company and/or product.

B174/4560/DN

Company	Comments	Country	Website
Alcon A/S	Provides biomass heating equipment up to 750 kW through many models	Denmark	www.alcon.nu
Ariterm Group	Central heating boilers and a variety of bioenergy burning devices from 3 kW to 3 MW	Finland	www.ariterm.fi
Berkes	Provides efficient biomass combustion technologies using torsional chamber or gasifier	Uruguay	www.berkes.com.uy
Biochamm Calderiras	Producer of boilers, burners, air preheaters, multicyclon filters, bin dischargers for different applications	Brasil	www.biochamm.com.br
Biomass Heating Solutions Ltd bhsl	Provides FBC technology suitable for a wide range of wood chips, including chipped virgin wood	Ireland	www.bhsl.com
Camina Ecotec Sweden AB	Products for pellet, wood and solar heating up to medium size	Sweden	www.ecotec.net
Compte-R	Designs, manufactures and installs wood and biomass furnaces (250 kW to 8 MW) and peripheral equipment for a wide range of industrial and municipal applications	France	www.compte-r.com
D'alessandro Termomeccanica S.R.L	Manufactures biomass boilers, warm water boiler range from 20 up to 4.1 MW and steam boiler range from 100 kW up to 7 MW	Italy	www.caldaiaalessandro.it
Danstoker A/S	Manufactures furnace and fire-tube oil and gas boilers, boilers for biomass and waste heat recovery boilers for biomass applications	Denmark	www.danstoker.dk
Ekoterm Proekt Ltd	Supplier of heating equipment, 18 kW to 50 kW for household use and 300 kW up to 1.1 MW for the public sector and industry, complete engineering and servicing of the built installations and equipment	Bulgaria	www.greenecotherm.eu
Enerstena Ltd	Manufacturer of biomass boiler plants from 1 MW to 25 MW and flue gas condensers for boilers from 5 MW to 50 MW	Lithuania	www.enerstena.lt
Enertech AB Osby Parca Division	Provides solid fuel boilers in the range of 100 kW to 7 MW that can handle moisture content up to 50 percent	Sweden	www.osbyparca.se
ETA Heiztechnik GmbH	Offers a wide range of boilers including wood gasification boilers, woodchip boilers, pellet boilers up to 350 kW	Austria	www.eta.co.at
Factory Sales and Engineering Inc	Manufactures solid fuel boiler systems for industrial applications	USA	www.fseenergy.com
Fire Fox Vertriebs GmbH	Produces forward-looking heating systems, central heating pellet systems from 10 to 500 kW and stoves	Austria	www.firefox.at
Fröling GmbH	Manufacture boilers for firewood, wood chip and pellets up to 1 MW as well as fuel feed systems and storage tanks	Austria	www.froeling.com
Fumo Aps	Manufacture of boilers for pellet, wood chip and grain from 12 kW to 500 kW	Denmark	www.fumo.dk
Gilles Energie & Umwelttechnik GmbH & Co KG	Manufacture boilers for firewood, wood chip and pellets up to 1 MW as well as heating containers, fuel feed systems and storage tanks	Austria	www.gilles.at
Guntamatic Heiztechnik GmbH	Manufacture of boilers and heating systems for biomass (pellets, firewood, woodchips) up to 400 kW	Austria	www.guntamatic.com
Hamont Consulting und Engineering	Boilers for biomass burning (pellets, woodchip and other wood residue), fully automatic from 15 kW to 500 kW	Austria	www.hamont.com
HDG Bavaria GmbH	Manufacture of boilers and heating systems for biomass (pellets, firewood, woodchips)	Germany	www.hdg-bavaria.de
Herz Energietechnik GmbH	Manufactures wood gasification boilers, pellet boilers, woodchip boilers, heat pumps, buffer & hot water tanks and valves. The principal focus is on modern and environmentally friendly heating systems.	Austria	www.herz-energie.at
Hollensen Energy A/S / Industrivarmer	Turnkey biomass-fired boiler plants that operate with woodchip, straw, waste wood or wood pellets from 400 kW to 15 MW per unit	Denmark	www.hollensen.dk
Hurst Boiler & Welding Co., Inc.	Boiler designs and manufactures hybrid and solid fuel-fired boilers fuelled with biomass	USA	www.hurstboiler.com
Josef Binder Maschinenbau- und Handelsges.m.b.H.	Manufacture of biomass boilers from 100 kW to 10 MW for commercial, industrial, and communal applications	Austria	www.binder-gmbh.at
Justsen Energiteknik A/S	Manufacturer of hot water and steam boiler systems and combustion equipment for biofuel from 1 MW to 20 MW.	Denmark	www.justsen.dk
Kiv d.d	Producer of boilers and burning equipment for different fuels - waste wood, household waste - biomass from 50 kW to 25 MW	Slovenia	www.kiv.si
Kohlbach Group	Manufacture of water, steam and thermal oil boilers and heating systems for biomass and more (e.g.residues from wood processing) from 400 kW to 18 MW	Austria	www.kohlbach.at
KPA Unicon Group Oy	Provider of comprehensive boiler plant projects starting with the choice of fuel all the way up to the production of heat and steam	Finland	www.kpaunicon.com
KWB - Kraft und Wärme aus Biomasse	Manufactures boilers and heating systems for biomass (pellets, woodchip, firewood) from 10 kW to 300 kW	Austria	www.kwb.at
Köb Holzfeuerungen GmbH	Heating technology for firewood, shavings, pellets and woodchips from 4 kW to 1.7 MW	Austria	www.kob.cc/
L. Solé S.A.	Provides turnkey biomass plant. Manufacture wood-drying kilns and biomass boilers	Spain	www.lsole.com

Major UK boiler order nears completion

Last March the UK's largest turkey farmer and turkey meat producer Bernard Matthews announced a major environmental project to install biomass boilers to heat its turkey sheds, replacing liquid petroleum gas (LPG) boilers currently in use. The Norfolk-based company rears approximately 7 million turkeys per annum at 21 turkey farms in Norfolk, Suffolk and Lincolnshire.

The contract for the boilers was given to the Austrian heating equipment manufacturer HERZ Armaturen GmbH via its UK partner Rural Energy Ltd. Worth over £4 million (about EUR 5 million) HERZ are to supply 179 of its "Firematic" woodchip boilers supplied and installed into customised con-

tainer boiler rooms complete with woodchip storage. Each farm has an average of eight or nine poultry sheds, with the largest having 34.

The boilers will initially use woodchip as fuel and Bernard Matthews estimate a six figure annual saving on heating costs. The company also has plans to use pelletised poultry litter as fuel. However for this to be administratively possible, a change in classification is needed as currently poultry litter is classed as waste and not a by-product.

The overall investment of the project amounts to £24 million (about EUR 30 million) and is expected to be complete by the end of October this year.

B174/4544/DN



One of many new Herz boiler installations at UK turkey producer Bernard Matthews, replacing LPG boilers at 21 turkey farms producing 7 million turkeys per annum.

Company	Comments	Country	Website
Laatukattila Oy	Manufactures boilers, district heating plants and waste burning equipment for burning wood, chips, sawdust, bark, pellets, sod peat, coal, oil, gas, solid waste from 10 kW to 8 MW	Finland	www.laka.fi
Lin-Ka Maskinfabrik A/S	Manufacture fully-automatic firing systems for agriculture, industry and district heating plants. Systems based on biofuels with sizes from 25 kW to 10 MW	Denmark	www.linka.dk
Metro Therm A/S	Provide boilers, accumulators, district heating units, and also Naturenergi lwabo pellet heating	Denmark	www.metrotherm.dk
Müller SA Chauffages Au Bois	Wood furnaces for wet and dry fuel and special heating systems for pellets with low-particle concept, combustion optimisation and high efficiency control. Range from 100 kW to 5 MW	Switzerland	www.mueller-holzfeuerungen.ch
Nolting Holzfeuerungs-technik GmbH	Special chip of stumpwood boiler with output of 45 to 134 kW Other biomass (e.g. woodchips, chippings and bark) boiler with output of 215 to 2.5 MW	Germany	www.nolting-online.de
P.H.U Isol S.C Ewelina Brzeska Michal Brzeski	Pellet burners range from 5 kW to 350 kW	Poland	www.pellax.eu
Passat Energi A/S	Manufactures biofuel plants, supplies boilers both to the private consumer and smaller industry as well as district heating	Denmark	www.passat.dk
Polytechnik Luft-und Feuerungstechnik GmbH	Supplies biomass fuel combustion plants with an approximate range of performance of 300 kW to 30 MW	Austria	www.polytechnik.com
Reka A/S	Boilers for burning straw and wood. Provides projection and construction of complete combustion district heating plant	Denmark	www.reka.com
Schmid AG, Energy solutions	Wood-firing systems for family homes to large-scale systems up to 25 MW	Switzerland	www.schmid-energy.ch
Sonnys Maskiner AB	Boilers up to 450 kW for burning different kind of biomass	Sweden	www.sonnys.se
Swebo Bioenergy AB	Heating plants, equipment and systems for chips, pellets, sun, horse and chicken manure from 10 kW to 20 MW	Sweden	www.swebo.com
Säätötuli	Wood boilers 30 kW and 150 kW, biomass burners 20 kW up to 1.5 MW for woodchips, peat, wood and peat pellets, heating containers 50 kW up to 1.5 MW, hot air systems from biofuels 300 to 500 kW	Finland	www.saatotuli.fi
Talbotts Biomass Energy Systems Ltd	Biomass boilers range in general 25 kW to 1 MW	United Kingdom	www.talbotts.co.uk
UAB "Kalvis"	Boilers and stoves for biomass fueled with wood and pellets up to 5 MW	Lithuania	www.kalvis.lt
Uniconfort S.r.l	Manufacturer of heating systems including compatible boilers, air generators, grinders	Italy	www.uniconfort.com
Weiss Kessel Anlagen und Maschinenbau GmbH	Construction of boilers and combustion systems for solid fuels, especially wood wastes from 500 kW to 60 MW	Germany	www.weiss-kessel.de
Veljekset Ala-Talkkari Oy	Manufacture of heating boilers and solid-fuel feeding devices for bio heating from 30 kW to 1 MW	Finland	www.ala-talkkari.fi
Wellons FEI Corp	Designs and manufactures a full range of products and can provide integrated packages combining wood-fired boiler systems and lumber dry kilns	Canada	www.wellonsfei.ca
Xuzhou Orient Industry Co. Ltd	Tiannong Biomass Burner and Boiler 250 KW to 3 MW	China	www.orient-biofuel.com

Bioenergy International Boilers & Burners Directory 2014

Note that the information used comes from the companies or from their web pages. In many cases a company also can supply other equipment and/or services. This is easy to check if needed; all web pages are presented in the table and the links are clickable on the online pdf file version.

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INTERFORST - AN INTERNATIONAL SCORCER



A taste of “neu” and “neuheit” at Interforst, (1) Valtra showcased an articulated tractor that brings a new dimension to tight cornering. (2) An array of truck-mounted chippers were on display, here a fire-engine red from Austrian Eschböck Bieber. (3) A rubber-tracked Ecolog harvester on the WFW stand. (4) Well-packed outdoor stands (5) “Neu” mega land clearance/forestry mower from AWHI. (6) Sometimes a stump grinder just doesn’t cut it but an R-Top stump borer from Dutch company Bijl Groentechniek just might do instead. (7) Integrating mobile data acquisition with photo-optical timber scaling, Manfred Ide, CEO for Fovea UG.

Held in a sweltering hot July the 11th edition of Interforst was a record-breaking and bullish forestry tradeshow with more exhibitors, space and visitors than ever before.

HELD ONCE EVERY FOUR YEARS IN MUNICH, GERMANY, Interforst has evolved since its first show in 1970 to become an international must-attend for forestry and wood energy pro’s. Whilst it has always been important for German-speaking central European foresters, post-event figures released by the organisers, Messe München confirm an observation; the show’s growing international flair. 162 of the 450 exhibitors were international, a 25 percent increase from the previous edition. Around 50 000 visitors from 72 countries braved the heat during the five-day fair. Almost one in five came from outside Germany, a trend duly noted by exhibitors.

Bullish and investment-“friendly” mood

There was plenty to see despite a tendency by exhibitors to pack exhibit space which made the odd demo, quite literally, a hair-raising experience. Notwithstanding the squeeze, net exhibit space had increased by 15 percent to 40 000 sq.m. Business it seems was brisk with product launches and

several OEM’s reporting on site sales, which is unusual.

– We are very satisfied and positively surprised at the keen interest shown by the visitors. We have concluded business transactions that had not been prepared; we did not expect this, commented Ralf Dreeke, CEO for Wahlers Forsttechnik GmbH, a forestry equipment dealer.

– We had excellent visitor numbers and the quality of the customers matched us perfectly. The mood was good, clients were “investment-friendly” and showed tangible interest, said Thomas Tinnacher, Sales Manager for Austrian firewood machinery producers Posch GesmbH.

– We noted very good attendance by our German customers and are astonished at the large number of international customers, including Eastern Europe, at our booth. We have been able to conclude transactions and initiate new business, said Melanie Horstmeier, Marketing, Jenz GmbH Maschinen- und Fahrzeugbau.

The next edition of Interforst will be back at Messe Munich in July 2018.

*Text & photos: Alan Sherrard
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Euroforest - a resounding succès

Held once every four years in the heart of the Burgundy forest, the 6th edition of Euroforest, the French “in the woods” forestry tradeshow, was a resounding succès. According to the organizers, AprovalBois and Coopérative Forestière Bourgogne Limousin (CFBL), the three day event attracted over 39 300 visitors who browsed their way through the 400 or so predominately French exhibits on the 150 hectare (ha) Saint-Bonnet-de-Joux site.

In the forestry tradeshow world these figures make Euroforest a major forestry event and a look at figures from the French Ministry of Agriculture, Food and Forestry gives some background. With 15.5 million ha or 28 percent of the national territory France has the 3rd largest forest estate in Europe, after Sweden and Finland. Annual fellings (2013) amount to around 39.6 million m³ of which 6 million m³ is for energy purposes. The country is the 4th largest producer of roundwood in Europe, after Sweden, Germany and Finland but is the number one European producer of hardwoods. However France has also the largest stock of standing wood in Europe, currently at 2.5 billion m³ with an annual increment of 25 million m³, suggesting more can be done.

With that in mind along with the increasing interest in using wood for energy it is not so surprising that Euroforest has grown over the last two decades. Around 25 percent of the exhibitors showcased energy-related products and services such as firewood processors, chippers, stoves and boilers. It seems though that there is room for expansion. The organisers plan to develop the internation-



Chippers come in all shapes, a handy size for a future French forest owner?

al dimension of the event in a bid to attract overseas forest technology OEM's and expand the energy-from-wood aspect further.

The 7th edition of Euroforest, slated to be held 21-23 June 2018, will reveal if they are successful.

Text: Alan Sherrard

Photo: Pellewood

B174/4498/AS

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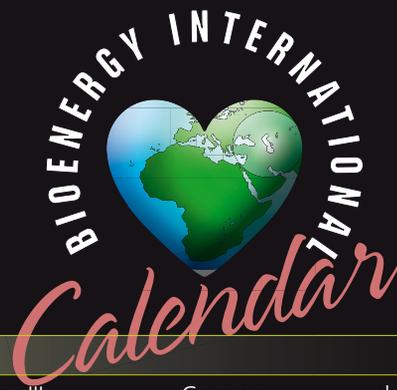
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www.bioenergyinternational.com



SEPTEMBER			
10-11	International Conference: Progress in Biogas III	Germany	www.biogas-zentrum.de
10-11	F.O. Lichts Sugar & Ethanol Africa	South Africa	www.sugarethanolafrica.com
10-12	Renewable Energy World Asia 2014	Malaysia	www.renewableenergyworld-asia.com
10-12	PowerGEN Asia 2014	Malaysia	www.powergenasia.com
15-18	Int. Bioenergy from Forest 2014 Conference	Finland	www.bioenergyevents.fi
16-19	SPACE 2014 - Int.exhi. for animal productions	France	www.space.fr
16-18	Bio-Energy China Conference 2014	China	www.cibeexpo.cn
17-18	World Bio Markets Brazil	Brazil	www.greenpowerconferences.com/BF1409BR
23-25	5 th Biomass Pellets Trade & Power	Korea	www.cmtevents.com/aboutevent.aspx?ev=140916
23-25	RENEXPO Poland	Poland	www.renexpo-warsaw.com
30-02	Conference of European Biogas Association	Netherlands	www.biogasconference.eu
30-02	Nordic District Heating	Sweden	www.elmia.se/en/fjarrvarmemassan
OCTOBER			
01-03	4 th USIPA Pellet Export Conf	USA	www.theusipa.org/conference
08-09	European Bioenergy Exhi. & Conf./ Nextgen	UK	www.nextgenexpo.co.uk
09-12	RENEXPO 2014	Germany	www.renexpo.de
14-15	13 th Pellets Industry Forum	Germany	www.pelletsforum.de
15-16	7 th Annual Balkan Energy Finance Forum	Albania	www.eeevents.co.uk/balkan_energy_finance_forum_2014
16-17	Biogas China	China	www.biogaschina.com.cn
16-19	Int. Greentech & Eco Product Exh. & Con. Malaysia	Malaysia	www.igem.com.my/2014
20-22	Argus European Biofuels and Feedstocks	UK	www.argusmedia.com/euro-biofuels
21-23	Expobiomasa 2014	Spain	www.expobiomasa.es
22-24	Palmex Indonesia 2014	Indonesia	www.palmoilexpo.com
28-29	World Bio Markets USA	USA	www2.greenpowerconferences.co.uk/BF1410US
29-31	Int. Exhi. on Heating & Heat Power Technology	China	www.heatecchina.com
NOVEMBER			
03-04	7 th Int. Woodfibre Resource & Trade Conf.	Chile	www.woodfibreconference.com
03-06	17 th World Ethanol & Biofuels	Hungary	www.worldethanolandbiofuel.com/
05-06	Biomass Power & Pellets Brazil	Brazil	www.greenpowerconferences.com/BP1411BR
05-06	IEA Workshop on Cofiring biomass with coal	USA	cofiring4.coalconferences.org
11-13	Total Energy USA	USA	www.totalenergyusa.com
19-21	Renexpo South East Europe 2014	Romania	www.renexpo-bucharest.com
DECEMBER			
01-02	Bioenergy Australia 2014	Australia	www.bioenergyaustralia.org
02-03	8 th International Algae Congress	Belgium	www.algaecongress.com
02-05	Pollutec	France	www.pollutec.fr
JANUARY			
19-20	Fuels of the Future 2015	Germany	www.fuels-of-the-future.com
21-22	Lignofuels 2015	Spain	www.wplgroup.com/aci/conferences/eu-eef6.asp
27-29	Biogas Convention & Trade Fair	Germany	www.biogastagung.org/en
FEBRUARY			
25-27	World Sustainable Energy Days 2014	Austria	www.wsed.at
MARCH			
04-06	Enreg Energia Regenerabila	Romania	www.enreg-expo.com
10-14	ISH 2015	Germany	www.ish.messefrankfurt.com
11-12	RENEXPO Central Europe	Hungary	www.renexpo-budapest.com

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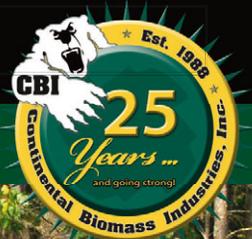
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