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under the dome

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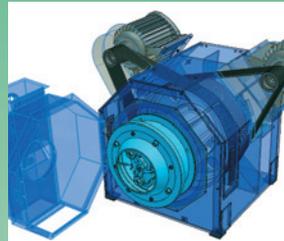
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COVER PHOTO



Earlier this year Drax Biomass loaded its first consignment of own produced pellets at its new Port Allen facility, which is located on the east bank of the Mississippi River in Baton Rouge, Louisiana (photo courtesy BRUKS Rockwood).

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CORRECT, SOUTHERN US FORESTS ARE NOT FUEL

At the time of writing, Stockholm, Sweden is gearing up for this year's Nobel Prize, paying tribute to some of the sharpest minds on the planet that have benefitted humankind with their research. Meanwhile the Conference of Parties (COP21) meeting in Paris, France is in progress. The last few months in the lead up to the event have seen a sudden proliferation of reports, studies, papers and briefings pertaining to climate change, renewable energy (read electricity) and biofuels.

One important and welcome read is the Forest2Market report Wood Supply Trends in the US South 1995–2015. Commissioned by the US Endowment for Forestry and Communities, National Alliance of Forest Owners (NAFO) and the US Industrial Pellet Association (USIPA) the report is based on transaction data. It reveals that in 2014, the total removal of wood in the US South for all markets was 3.3 percent of the total forest inventory, where 0.08 percent were pellet exports. Moreover, a tripling of current pellet exports to 10.8 million tonnes still represents only 0.3 percent of total forest inventory. The how, where, when and what type of forest is "removed" is a related but different issue and regulated in forest legislation, forestry practice codes and sustainability certification schemes. It's a distinction that organisations behind campaigns like "Our Southern Forests are not Fuel" ought to take note of as the report leaves only one conclusion, and they are entirely correct – in terms of volume removals, the US export of industrial wood pellets to meet renewable energy goals in the European Union (EU) is not a threat to the sustainability of US Southern forests. The report essentially confirms that indeed US Southern Forests are Not Fuel.

Taking a fiscal approach, a global carbon tax is, as The Economist remarked in its Hot and Bothered Special Climate Report, the "best way" to tackle climate change. It would "drive the most polluting power stations off the system". If combined with market reforms, it would "force renewable power producers to bear the costs of their intermittency." Biomass could FIT into the system offering reliable, dispatchable base-load and/or peak-load and/or storage. A point missed in the report, which failed to discuss biomass other than to suggest that research on cheap, clean stoves for poor countries would improve health and reduce emissions from wood. It may, but so would spending on developing decentralised renewable cooking fuel production facilities and supply chains, such as the Ethiopian ethanol project featured in this issue.

William Nordhaus, a climate economist cited in the report, has calculated that if every country in the world were to tax carbon, temperatures could be held to 2 °C above pre-industrial levels at a cost of 1-2 percent of global income annually. If the scheme were confined to countries representing only half of global emissions, the 2 °C target would be nigh impossible to hit. The Organisation for Economic Co-operation and Development (OECD) has calculated effective carbon rates (ECR) on CO₂ emissions from energy use for 41 countries, which together represent 80 percent of global emissions. It found that only 10 percent of CO₂ emissions from all energy use in the 41 countries are subject to an ECR rate above EUR 30 per tonne, the estimated climate damage cost from emitting 1 tonne of CO₂. The Economist report concluded that a global carbon tax is likely to remain an "economic theory" for a long time and "certainly nothing of the sort will be seriously discussed in Paris". Au contraire, most certainly something of the sort was very seriously discussed with the official launch of the Carbon Pricing Leadership Coalition at COP21. For the first time, an unprecedented alliance of Heads of State, city and state leaders, with the support of heads of leading companies, have joined forces to urge countries and companies around the globe to put a price on carbon. That is a good starting point and a great note of optimism with which to close our final issue for 2015.



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20 "Jenny" is a new 12 MW biomass boiler being commissioned in Insjön, Sweden and a first for Belgian boiler manufacturer Vyncke. It is ready to provide heat for BIO-DAL, a public-private company.



8 US-based Dome Technology is a pioneer in dome storage solutions that, according to the company, outperform traditional silos and flat storage warehouses for dry bulk. What originally began over 35 years ago as an innovative steel-reinforced concrete construction process is now finding it ideally lends itself to large volume storage of wood pellets.



37 Future Biogas and Triogen have opened the first UK installation of a Triogen ORC power unit at the Oak Grove Renewables biogas site in Norfolk. The event was officiated by the deputy Dutch ambassador to the UK, Margriet Leemhuis.



19 Since the China State Council issued the Action Plan on Prevention and Control of Air Pollution in 2013, one boiler maker, Huzhou Huangqing Environmental Technology Co., Ltd is seeking to leverage efforts to replace small coal-fired boilers with biomass.

12 Stena Germanica is the world's first ship in commercial operation running on methanol. A deeper understanding of the fuel called for a new approach Fire safety approval for world's first methanol powered ship

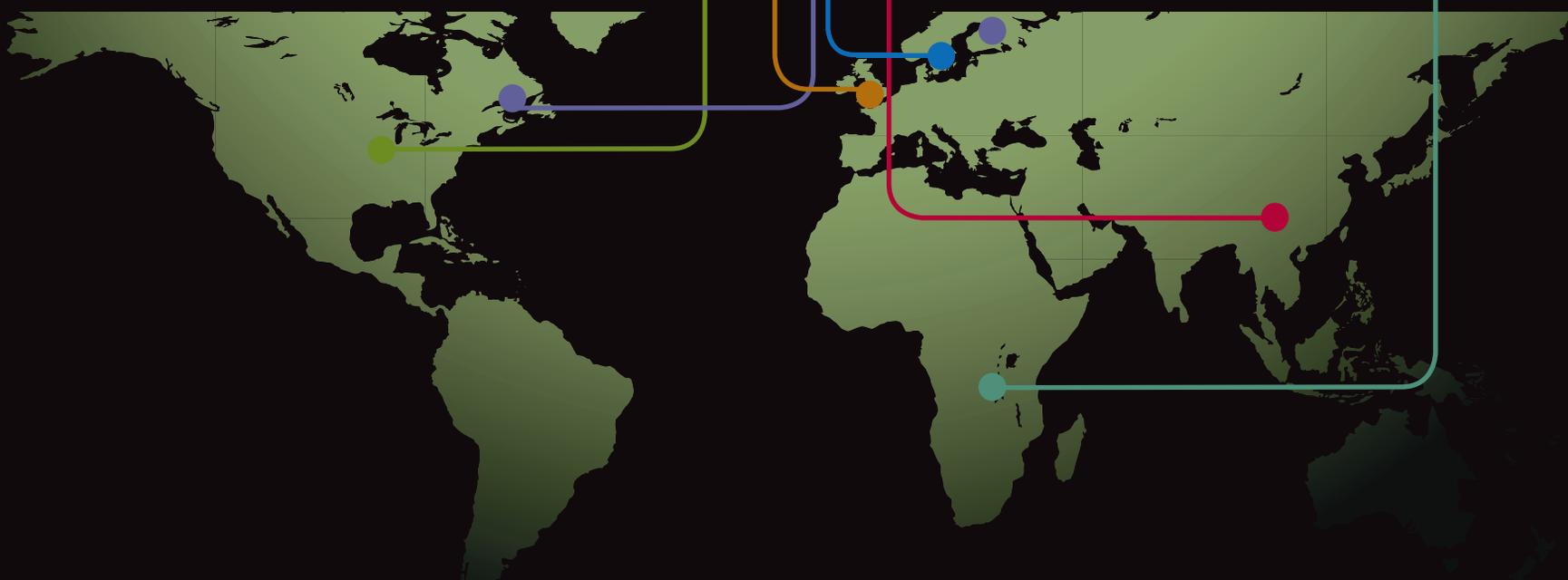


15 For Canadian wood pellet producers, Halifax, Nova Scotia was the place to be for WPAC's conference to learn how to stay ahead of the export market curve and find the best opportunities.



23 As an equipment manufacturer with over a century of experience in crushing, processing, feeding, conveying and storing of bulk materials, Jeffrey Rader has, it seems, remained under the radar for the biomass to energy sector.

25 A collaborative project in Addis Ababa, Ethiopia, offers crucial insights into the challenges of transforming household cooking fuel markets.





Pellets Under the Dome

Photo courtesy Dome Technology

US-based Dome Technology is a pioneer in dome storage solutions that, according to the company, outperform traditional silos and flat storage warehouses for dry bulk. What originally began over 35 years ago as an innovative steel-reinforced concrete construction process is now finding it ideally lends itself to large volume storage of wood pellets.

LOOKING AT THE AERIAL IMAGE of the Drax Power station in the UK, the four white pellet storage domes resemble a giant clutch of eggs. If it had been built prior to 2009 it might have been a source of inspiration for Stephen King’s “Under the Dome” sci-fi novel and subsequent TV series. Each of the four storage domes is enormous, measuring just over 50 m in height and 63 m in diameter and capable of holding 80 000 tonnes of pellets. In total the domes could store a massive 320 000 tonnes of wood pellets, equivalent to the annual production of a reasonably sized pellet plant.

The first-of-its-kind biomass



storage project in the UK and a new storage solution for Drax, who had previously chosen flat storage and silos, it was also the largest project ever for Dome Technology. While the size and scale of the Drax power station storage project were unprecedented it was not the first wood pellet dome project.

– We have several biomass projects in the US, such as the Savannah Bulk Terminal in Georgia for Georgia Biomass; the Enviva Biomass Terminal in Chesapeake, Virginia and Enviva in Wilmington, North Carolina and for Quebec Stevedoring (QSL) in Canada. The domes were more economical and have a smaller footprint than other technologies and a quicker build process, recounted Lane Roberts, Sales Manager, Dome Technology.

– We have completed over 270 industrial projects worldwide. These are found at power plants

like Drax, but also mines, heavy industry and terminals for storing dry-bulk products - for instance cement, potash, coke or agri-bulk like corn, soybeans, sugar, canola and wood pellets, said Roberts.

Inherent strength provides options

The thin-shell structure consists of several layers and whilst the domes may appear alike, no two projects are the same since each is tailored to the individual project. A bulk-storage project usually begins with assessing the material to be stored along with site constraints and operational requirements of the client factored into the initial design and engineering of foundations, tunnels, domes and operational systems. Precast concrete tunnels can speed up project delivery and, paired with various dome shapes and floor configurations, accom-

modate efficient underground mechanical reclaim systems.

– The inherent strength of the dome allows for diverse foundation and product reclaim options. The concrete ring beam serves as both footing for structure and the belt keeping the structure in tension, explained Roberts.

In locations where soil conditions would require deep foundations beneath traditional structures, intermediate options can often suffice with a dome.

– The Savannah Bulk Terminal project is a good example. Here the operators, Peeples Industries, were originally considering a conventional A-frame storage solution for 50 000 tonnes of pellets. This would have required a deep pile foundation on account of the soggy Savannah soil, said Roberts, adding that the cost of piling alone would have been equal to about

“The inherent strength of the dome allows for diverse foundation and product reclaim options.”

LANE ROBERTS

Sales Manager, Dome Technology.

half the cost of one of the two 25 000 tonne capacity domes that were built.

Novel construction process

The feature that gives the dome its initial shape is the innovative PVC air-form that acts as the air-supported structure for applying additional layers of shotcrete. Upon completion, it remains in place as the outer waterproof membrane. Once attached to the ring beam and inflated, the air-form creates a protected environment, allowing construction to continue inside the dome in almost any weather conditions. The continuous single-ply PVC membrane is coated on both sides with a mould-resistant UV-protective resin that provides long-term protection from sunlight and microbial degradation.

– The air-form is one of few components not sourced locally. We fabricate it at our facility in east Idaho to match precise design requirements, revealed Roberts.

Multiple layers of polyurethane foam are then applied to the inflated air-form. With fasteners inserted and the foam hardened, this foam serves a structural role in supporting the first layers of steel matting and concrete. The application of multiple layers of steel-reinforced concrete is the final step in the dome construction process before project-specific features are included.

Cut outs in the dome accommodate gravity feeding, explosion venting, front-loader access, conveyor access, and other access needs. Head-houses are constructed atop the dome, along with other steel structures. Pneumatic floors, mechanical screws, other reclaim systems, climate systems, and specialized hardware are installed within a dome.

– Upon completion, the air-form remains in place as the outer waterproof membrane, the foam acts as a thermal insulator protecting both the concrete dome structure and the product stored inside, and the reinforced concrete is what gives our domes their brute strength, said Roberts.

Climate control

Brute strength is not an overstatement as Roberts revealed that for the Enviva Biomass project in Chesapeake, the domes were re-

quired to be able to withstand hurricanes with 320 km/h (200+ mph) winds. Nonetheless, all factors being equal to other storage options there are essentially two major characteristics that would seem to give Dome Technology a specific advantage for large-volume wood pellet storage.

– Our domes are waterproof, insulated and almost completely airtight. As a result temperature fluctuations inside the dome are tempered, the formation of condensation is avoided and the internal atmosphere can be manipulated to mitigate off-gassing and self-combustion; for instance nitrogen can be used. Incidents with self-heating and combustion happen far less frequently compared to other storage forms, explained Lane Roberts.

Domes that store wood pellets are built with an explosion panel over the vent at the apex; this panel seals out moisture but is rated to release in an explosion event or when air pressure is excessive.

– When the explosion panel is loosened, the shape of the structure channels energy through the panel, meaning less chance of your dome being compromised should an explosion occur, said Roberts.

The unique “tops” for the Drax Power station domes were specially designed. Calculated to meet ATEX and DSEAR requirements the weather-proof design incorporates a 90-foot opening at the apex of each dome to accommodate panels, which relieve and dissipate pressure should it arise. A stiffening structure was used to spread the load of the head house, which sits between the relief panels, evenly down into the dome shell.

Drax Port Allen project

In the US, Drax has two 450 000 tonne per annum pellet plants in operation, Amite BioEnergy in Gloster, Mississippi and Morehouse BioEnergy in Bastrop, Louisiana. The company has also recently completed its port facility in Baton Rouge, Louisiana. Located at the Port of Baton Rouge on the east bank of the Mississippi River, the Drax Port Allen facility acts as a hub for wood pellets from its US Gulf plants and third-party suppliers, providing both storage and loading terminal prior to shipment. The new facility forms part of



An aerial view of Europe's largest biomass power project, Drax Power station in the UK with four pellet storage domes (photo courtesy Drax).



The Drax Power domes close-up with the unique specially designed weather-proof “tops” to meet ATEX and DSEAR requirements (photo courtesy Drax).

Drax's US\$350 million investment in its biomass operations in Louisiana and Mississippi.

Delivered by road and rail

Operating within the Port of Baton Rouge secure area, the port-side facility features a ship loader, open plan control building with a panoramic view of the terminal, and two 40 000 tonne capacity domes for storing pellets.

– Like in Savannah, a location near the Gulf of Mexico means soggy soil and therefore potentially expensive foundation work. Furthermore, in this case, building a facility within 1 500 feet (457 m) of a levee meant getting design approval from the Army Corps of Engineers, said Roberts.

The port facility primarily handles pellets from Drax's two pellet plants. From Morehouse, which is located more than 380 km (238 miles) from the port the pellets are railed using railcar train sets. Each train set has 80 railcars and is about 1.6 km (1 mile) long end-to-end and can carry about 7 200

tonnes of pellets. The facility is designed to unload six to seven railcars, or 540–630 tonnes of pellets, per hour.

From Gloster the pellets are trucked and to ensure drivers can unload quickly and safely at the port, a sophisticated automated system has been designed to handle and unload trucks at the touch of a button. The fully automated system discharges each pellet load in less than three minutes, keeping drivers a safe distance from the conveyors and chutes, with no need to climb on or under their trucks to unload.

Ship loader from Bruks

The domes are connected to rail- and truck-unloading pits via transport towers and conveyors. An automated mechanical screw system is used for reclaim from the domes to minimize dust. Downstream of the domes is the ship loader, which is located on a dock that dates back to the mid-1950s. Without the benefit of a new ‘greenfield’ site, plans had to be adapted to accommodate constraints presented by the existing dock. Major challenges included building the ship loader and an-



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chor points for the rails onto the existing dock as well as providing new mooring points for larger vessels. The moorings have to be designed with sufficient strength to hold vessels on berth even at times of the high water flows, which are typical on the Mississippi River.

The shiploader was supplied by BRUKS Rockwood, a global leader in mechanical engineering and equipment supply for bulk-storage facilities. The scope of supply included the complete traveling, luffing and slewing ship loader. It is designed to transport and load pellets at a rate of 1 200 tonnes per hour and fully load a Panamax vessel with 65 000 tonnes in three days.

In April 2015 the first boat, a 'Handy' sized vessel, set sail on the Mississippi River from Drax's new port facility. It carried 25 000 tonnes of the first wood pellets produced by the Gloster plant testing the supply chain, from pellet plant to port and port to vessel, in preparation for the first Panamax-sized vessel.

According to Lane Roberts, BRUKS is an important vendor for Dome Technology projects in the biofuel realm with multiple projects utilizing BRUKS equipment in Dome's project portfolio, the most common being equipment used to deliver material to or from the dome, especially in the form of ship loaders and unloaders.

– For these projects, BRUKS completes the engineering for their systems and that requires a thorough understanding of the machinery and the bulk product in question, ended Lane Roberts.

*Text: Alan Sherrard
B183/5122/AS*



BRUKS Rockwood was selected to provide complete engineering and equipment for the ship loader. This travelling, luffing, shuttling ship loader is designed to load wood pellets at a rate of 1 200 tonnes per hour (photos courtesy Bruks Rockwood).

Statkraft biomass hub delivers first shipment of woodchips

Norway-based Statkraft, Europe's largest generator of renewable energy, has successfully shipped over 3 000 tonnes of woodchips to a leading Danish customer. The consignment is the first woodchip cargo to be shipped from Statkraft's new biomass trading hub, which opened in August at Tofte, Norway. The site of the former Södra Cell paper mill, Statkraft is processing roundwood to energy chips at the site with moisture content close to 30 percent.

– There is significant annual

growth of the demand in the Scandinavian woodchip market forecast for the next few years and Statkraft has responded by creating a new product that is tailor-made for these customers, commented Christopher Moore, Head of Biomass Trading and Origination for Statkraft.

He added that the strategic location south of Oslo directly on the Oslofjord with deep water and short sea ice-free vessel berth capacity operating 24/7 make the terminal perfectly suited for sustainable biomass products.

– This ensures a quick turnaround of vessels and enables customers to accelerate their supply chains to receive their products on a just-in-time basis, explained Moore.

The terminal has sufficient storage capacity for 100 000 tonnes of roundwood logs and 50 000 tonnes of woodchip, as well as covered storage for up to 20 000 tonnes of wood pellets. Supplies of biomass



material are being received by road and sea and Statkraft is aiming for an annual throughput of ½ million tonnes of handled biomass materials to service the European energy market.

– The biomass is sourced from sustainably managed forest certified in accordance with PEFC (Programme for the Endorsement of Forest Certification) and we expect to be SBP (Sustainable Bio-

mass Partnership) certified by the end of the year. In addition, we can help other companies with their woodchip logistics optimization, said Moore.

Statkraft's future plans for Tofte include an expansion into the liquid biofuel sector with the implementation of a production facility in partnership with SödraCell.

B183/5132/AS



Christopher Moore, Head of Biomass Trading and Origination for Statkraft.



Fire safety approval for world's first methanol powered ship

Photo courtesy Stena Line

Stena Germanica, the world's first ship in commercial operation running on methanol, is approved after SP Fire Research performed risk assessment and design of the fire safety based on SOLAS II 2/17 "Alternative design and arrangements". Although methanol has long been handled with traditional fire protection in cargo pump-rooms on tankers, a deeper understanding of the fuel called for a new approach to achieve sufficient fire safety.

STENA GERMANICA is a so-called "ro-pax" ferry, bringing vehicles and passengers across the Baltic Sea. As of 1st January 2015 this area together with the North Sea and the English Channel is a Sulphur Emission Control Area (SECA) where stricter sulphur emissions regulations apply. Similar restrictions apply around the coasts of North America and several more areas are planned around the world for the future. The new requirements have posed serious challenges for shipping companies and demanded new technological solutions, including use of alternative fuels and exhaust gas treatment.

Many shipping companies have chosen to make use of Liquefied Natural Gas (LNG) to meet the requirements and avoid flue gas treatment. The same is achieved using methanol, but for this fuel the transportation and storage is far less complicated, both on the ship and ashore. Furthermore, there is a great benefit with methanol in the possibility to make it renewable from biomass in large scale in the future. Therefore Stena chose methanol for the Stena Germanica when it came to complying with the new regulations.

Regulatory framework for low flashpoint fuels

Flashpoint is the lowest temperature at which a fuel can be ignited; if the temperature is lower the fuel will not vaporize a sufficient amount of fuel gases. The flashpoint of methanol is far from as low as of LNG or gasoline but still lower than what is permitted by the international ship fire safety regulations in SOLAS (Safety Of Life At Sea). An international code under SOLAS on safety for ships using gases and other low-flash-

point fuels (the IGF Code) is under development. However, until such a code is ratified the only regulatory way forward is to show equivalent safety through SOLAS regulation I/5 or II-2/17. These regulations provide openings for alternative design and arrangements for fire safety but require that safety is not compromised.

A fire risk assessment was therefore carried out for the Stena Germanica to demonstrate how the particularities of methanol would be managed to assure that fire safety was not adversely affected. It was performed by SP Fire Research as part of a large technical methanol conversion project at Stena and involved classification society Lloyd's Register, engine manufacturer Wärtsilä and ship designer ScandiNaos as key partners.

Beyond traditional fire protection

In the first steps of the fire risk assessment it became clear that not only fire hazards associated with the lower flashpoint have to be considered for alternative fuels, even if this may be the only deviation. What is thereby addressed is generally the increased probability that flammable vapours of a low flashpoint fuel will accumulate and possibly ignite in case of a leakage.

However, it is not sufficient to only minimize the probability of leakage and ignition. A sound fire safety design must, as any regulatory framework, address all levels of fire safety. In the fire risk assessment, fire detection and fire extinguishment were also identified as areas in need of further investigation.

For example, how is detection and localization achieved when a methanol fire does not show visible flames or produce smoke? And how is extin-

guishment performed when the fuel in addition to the low flashpoint also has wide flammability limits and bound oxygen? These questions went beyond traditional fire protection and required further analysis.

Bunker tank, pump room and fuel piping installations

It was decided that the ship should be designed at least as safe as a conventional ship in each affected area of fire safety. To manage this, a number of risk control measures were added. For example, all fuel piping was designed double walled and butt-welded. The only space where methanol is managed in single walled pipes is the pump room. Here a robust drainage system was designed and the equipment used is suitable for explosive environment (ATEX).

Furthermore, a smart gas detection system was designed automated with the ventilation and the pump system; if methanol is detected the ventilation is increased and if a high level of methanol is detected, though still far below the flammability limit, the 700 bar methanol transfer to the engines is stopped. An automatic seamless transition is then made to run on diesel only and the methanol pipes are flushed with nitrogen.

The methanol storage tank is kept in a constantly inert state with nitrogen to avoid a combustible atmosphere. Furthermore, the tank will be surrounded by water on all sides, seawater and permanent ballast water tanks, which will directly neutralize the miscible fuel in case of a leakage. Bunker tanks at the bottom of the ship thus allow safe and efficient storage.

Detection and localisation becomes crucial as

a methanol fire neither produces visible flames nor smoke. Detection was managed by smart installations of detectors made to distinguish the electromagnetic radiation emitted when carbon dioxide is produced at combustion. Thereby the detection system was made independent of smoke and visible flame signatures. To localize fires when performing manual firefighting, infrared cameras were provided to the fire patrols.

Effects of fixed fire-extinguishing systems

The fixed fire-extinguishing systems required particular engineering efforts. In particular two common system alternatives were evaluated: inert gas, carbon dioxide (CO₂), and high-pressure water-mist. Several particularities of methanol led to realize that extinguishment would be harder to achieve. Methanol can burn down to an oxygen level of 12 percent, which makes it relatively less sensitive to dispersion. The effectiveness of an inert gas system with CO₂ is thereby reduced and more gas is required to achieve an equivalent extinguishing effect as for diesel.

When it comes to the effectiveness of a water-based system the insensitivity to oxygen dispersion plays part of the role. Furthermore, the low flashpoint makes direct surface cooling less effective and the lack of soot in flames makes flame cooling irrelevant. For a water-based system the primary extinguishing effect is instead dilution.

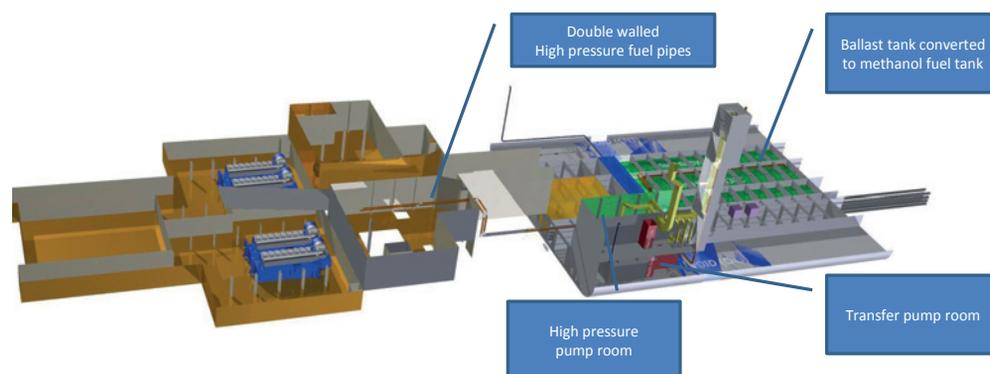
Fire safe ship and regulations

The fire risk assessment showed that the fire safety challenges of methanol are manageable. It also stressed that it is not sufficient to only address a low flashpoint deviation when considering alternative fuels. To assure that at least the same level of safety is achieved in each affected area, safety margins were used depending on the access to reliable data. Some conservative stands were necessary, for example with regards to fixed fire-extinguishment.

The need for knowledge and verification in this area has now led to the initiation of a new research project called proFlash. The project is coordinated by SP Fire Research and aims to further evaluate the effectiveness of fire-extinguishing systems for methanol and LNG by theoretical studies and full-scale testing. The results will work as direct input to the IMO correspondence group developing the IGF Code part applying to use of methanol fuel. The project may also give reason to further develop the merely



The primary extinguishing effect for water based solutions is dilution (photo Alexander Leandersson).



Schematic showing a methanol installation including bunker tank, pump room and piping for fuel transfer.

two pages of fire safety requirements in the part applying to LNG, which is only formalization away from ratification.

Approval of the Stena Germanica fire risk assessment was given by the Swedish Flag in January 2015. At the end of the same month the shipyard started the new fire protection installations. By managing each introduced fire hazard Stena is now confident that fire safety has not only been

maintained but improved by the conversion to methanol. Hopes are that the findings in this project and continued research will give a better understanding of alternative ship fuels and safer conversions to methanol and LNG in the future.

*Text: Franz Evengren, SP Fire Research
Editor's note: This article originally appeared in Brandposten #52/2015 and is used with kind permission of SP Fire Research.
B183/5084/AS*

Marine residual heat to power solution wins prestigious technology innovation award

Sweden-based technology developers Climeon AB has been awarded "Technology Innovation Award" by the multinational consulting and analytical firm Frost & Sullivan for its groundbreaking heat power solution. Climeon Ocean is a system that converts hot water between 70-120 °C into electricity and is scalable from 150 kW up to 1 MW. The technology has been successfully implemented aboard a passenger ferry, which sails between Sweden and Finland.

– No commercially available technology can convert water at 90 °C to electricity with reasonable efficiency but the Climeon system exceeds 50

percent of the theoretical maximum of 18 percent and functions at a low pressure of 2-3 bar, said Krishna Venkataramani, Frost & Sullivan Senior Research Analyst.

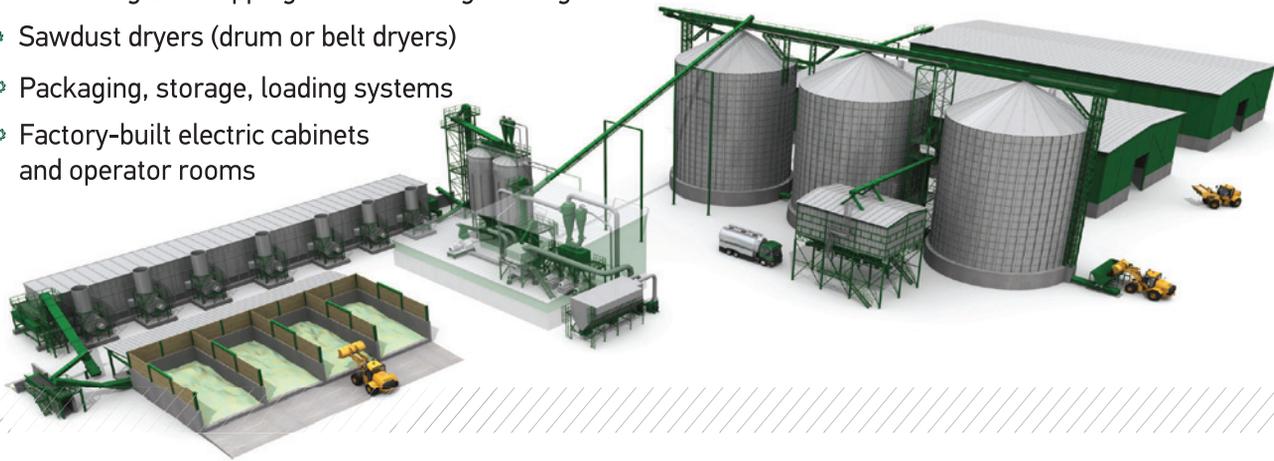
Though the basic technology has been known for years, Climeon customised and made it more efficient by avoiding losses such as pump losses, friction and resistance in the machine. The unit is capable of producing 690 volts or 220 volts output.

B183/5134/AS

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Heard in Halifax

What represents the greatest shift in the pellet market? Where are the best opportunities for Canadian producers next year and will that change over the next 3-5 years?

THESE WERE SOME of the headlines given by Michele Rebiere, CFO, Viridis Energy Inc., and President of Wood Pellet Association of Canada (WPAC) in her opening remarks and then discussed by around 180 participants during the 3rd WPAC held in Halifax, Nova Scotia, at the start of November.

Korean kerfuffle

Driven by the Renewable Portfolio Standard (RPS) obliging Korean generators to co-fire, the South Korean industrial pellet market emerged in earnest last year as, according to Fiona Matthews, Senior Analyst, HawkinsWright, imports climbed to 1.9 million tonnes up from 400 000 tonnes 2013 with Canada, Malaysia and Vietnam as main suppliers.

However, as Matthews explained, the tender system in place puts a very clear emphasis on price, which together with 30 percent lower demand this year thus far has pushed prices down to around US\$110 tonne/CIF, seemingly a price level matched by Vietnamese suppliers. At the beginning of 2015 Korean generators required FSC or PEFC chain-of-custody certificates from exporters. But fraudulent certificates appeared prompting the Korea Forest Promotion Institute (KFPI) to require biomass exporters to provide government-issued tenure documents and fibre supply contracts as sustainability evidence using an Apostille Certificate. As a result of this compounding factor from a Canadian perspective, Canada is not a signatory of the Apostille Convention, and exports dropped 74 percent over January through September.

Dutch SDE+

Thanks to lobbying from WPAC, Korean authorities have since revised requirements reopening the market for Canadian producers. Gordon Murray, Executive Director, WPAC also gave an update on the Netherlands once Canada's largest pellet export market. However

producers have not shipped any "meaningful volume" since 2011 as a result of Dutch policy change.

– When the Dutch MEP subsidy scheme expired just over 12 months ago, so too did co-firing with Canadian pellets, remarked Murray adding it was the UK, Belgium, Italy, Japan and South Korea that had grown.

Murray outlined the legislative and promotional efforts WPAC together with southern colleagues USIPA have made in getting acceptance for North American sustainability criteria, a pre-requisite for SDE+ eligibility. The new SDE+ subsidy system came into play earlier this year and is available through to 2023. Biomass co-firing is though restricted to plants from 1990 or later and capped at 25 petajoules (PJ) of electricity annually, about 3.5 million tonnes of wood pellets. Two energy companies applied this year for co-firing under the scheme but were unsuccessful, the EUR 3.5 billion budget for 2015 had already been taken for wind power projects.

– The earliest we could see any new co-firing in the Netherlands would be in late 2016 at Essent's Amer 9 plant, which is already converted for biomass. Others have conversion projects in the pipeline, but no investment decisions will be made until the results of the 2016 round of SDE+ applications are known. Assuming success, they have three years to complete their projects to retain the subsidy so the next wave of co-firing will not come on line until 2018 at the earliest, Murray explained.

He added that the sustainability requirements are likely to be "workable" for Canada but may be difficult for US producers depending on the Sustainable Biomass Partnership (SBP).

Gaining momentum

Elaborating on the SBP, Deborah Keedy, Drax Power recounted that the SBP was formed in 2013 to provide "assurance" that woody bio-



Proud pellet producer with his truck, Jonathan Levesque VP Marketing & Development, Group Savoie with Canada's first-of-its-kind bulk delivery truck.

mass, woodchip and pellet, is sourced from "legal and sustainable sources" noting the varied definition of sustainability between EU Member States.

– SBP meets all current EU sustainability requirements and recognizes the credibility of existing forest certification schemes such as FSC/PEFC. It does not wish to compete with or replicate them but address the gaps and their lack of uptake, said Keedy.

Getting pellet producers SBP certified has been a challenge, SBP require field audits to be performed by "approved" certification bodies that already carry out FSC and PEFC audits.

– SBP certificates are being issued and focus is on improving SBP resources to deliver certification in a timely manner, she said

Thus far only two such bodies have been approved by SBP and to date three pellet producers, Westervelt Renewable Energy, SBE Latvia Ltd and AKZ Ltd have been certified. According to Keedy, Drax aims for SBP to be the "primary measure for sustainability" by the end of 2016 while running its own system in parallel for an "intervening" period.

The real crunch question, as Deborah Keedy put it, is if SBP can gain broader acceptance beyond Europe as standard for wood pellet sustainability.

Text & photos: Alan Sherrard B183/5082/AS

Editor's note: An Apostille facilitates public document circulation by certifying the authenticity of the signature, see www.hcch.net



Michele Rebiere, CFO, Viridis Energy Inc., and WPAC President expressing her producer view as Scotia Atlantic Biomass during the "Power Panel".



– Focus is on improving SBP resources to deliver certification in a timely manner, remarked Deborah Keedy, Head of Biomass Procurement, Drax.



A job well done, Gordon Murray (left) Executive Director, WPAC gets a well-deserved pat on the shoulder by Brent Boyko, Senior Manager Business Development, Ontario Power Generation (OPG) during closing remarks.



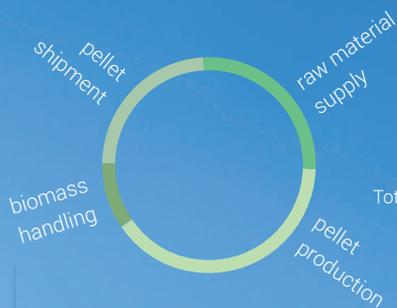
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In May 2014, Sturmberger Pelletsproduktionen GmbH, a subsidiary of Austrian timber merchants Sturmberger GmbH opened its gates in Wels, Austria, known by many as the location of the World Sustainability Energy Days and the European Pellet Conference. The 45 000 tonne per annum capacity facility is the latest Austrian pellet plant built using the “PELLET.TOWER” concept of Austrian compatriot, Teccon Konstruktionen GmbH.

– The pellet plant also sets top standards in terms of carbon dioxide (CO₂) mitigation for local customers, said Dr Christian Rakos, Executive Director of proPellets Austria and President of the European Pellet Council (EPC) explaining with the following calculation.

Local residues, residual heat and renewable power

The sawdust is sourced from nearby sawmills with an average transport distance of less than 50 km. Transport of the raw material to the pellet plant results in CO₂ emissions of approximately 4 kg CO₂ per tonne. The pellet plant is located next to the regional municipal solid waste (MSW) treatment plant and waste heat from this plant is used to dry the sawdust by means of a low temperature belt dryer. The specific power consumption of the pellet plant is 130 kWh of electricity for the production of one tonne of pellets. Electricity is supplied by the local utility Wels Strom that uses 90 percent renewable sources for power generation, which results in 46.4

kg CO₂ emissions per MWh electric energy. Consequently electric consumption of the pellet plant leads to emissions of only 6 kg CO₂ per tonne of pellets produced.

Another 1.5 kg of CO₂ is attributed to the operation of a wheel loader and forklift at the pellet plant. After production pellets are finally transported to the end-users. Upper Austria is a region with a relatively high density of pellet use. Over 27 000 households or 4.5 percent of all households use pellets for heating in this region. Consequently the average transport distance from the plant to the end-consumer is around 60 km resulting in another 3.6 kg CO₂ emission per tonne of pellets.

99 percent reduction

The total CO₂ emissions for pellet production and home delivery add up to 15.1 kg CO₂ per tonne of pellets or 3.1 kg CO₂/MWh of primary energy. In contrast, heating oil is generating emissions of around 269 kg CO₂/MWh.

– Thus a local household customer that switches from heating oil to pellets from the Sturmberger plant can reduce CO₂ emissions from heating by a massive 99 percent. This is surely a message that fits well into the on-going climate discussions, said Rakos suggesting that all pellet producers should do a similar CO₂ calculation exercise for their product.

B183/5130/AS

Enova pledges NOK 138 million for commercial biocoal plant



A cause for cake, Olav Brevik (left), Viken Skog; Björn Knappskog, Arbaflame; Oskar Gärderman, Enova; Rolf Jarle Aaberg, Trek Lyngen and Espen Lahnstein Norwegian Forest Owners Association.

The Norwegian innovation agency Enova SF has announced its intention to invest NOK 138 million in a commercial-scale biocoal plant subject to grant approval by the EFTA Surveillance Authority. To be built by Norwegian advanced pellet technology providers Arbaflame, the 200 000 tonne per annum capacity plant will be located in Follum at the site of a shuttered paper mill, which was acquired in 2012 by Viken Skog Group, the largest forest owner cooperative in Norway.

– Biocoal can be a very important contribution to reducing the planet’s total CO₂ emissions by replacing fossil coal. It makes it a future-oriented form of energy that can also help to give Norwegian forest industry a much needed boost, said Rolf Jarle Aaberg, General Manager of Trek Lyngen AS, a subsidiary of Viken Skog Group charged with developing forest-based energy and chemical products at Follum.

Apart from jobs the new plant will require around 500 000 m³ of roundwood per annum.

– We need more legs to stand on and the switch to green economy creates new opportunities for the forest industry. Thus it is good news as favourable conditions and support from funding agencies brings the project a step closer to realisation, commented Monica Mæland, Minister for Industry in a statement.

B183/5079/AS

Rentech Canadian plant update

In a recent update Rentech, Inc., reported on its two Canadian pellet production plants, which have had operational issues. In November the Atikokan facility achieved record weekly production of around 1 850 tonnes gaining on its design capacity of 2115 tonnes per week or 110 000 tonnes per annum.

The Wawa facility has resumed pellet production, having been offline to modify the log in-feed system and complete the most critical phase of its conveyer replacements. Wawa has been operating at approximately 30 percent of design capacity since coming online, and is again shipping pellets to the port of Quebec, for delivery to Drax.

B183/5136/AS

EC approves support for Lynemouth biomass conversion

The European Commission (EC) has concluded that UK support for the conversion of Lynemouth power station from coal to biomass complies with EU state aid rules finding that the project will “further EU environmental and energy goals without unduly distorting competition.” In December 2014 the UK notified plans to subsidise the conversion of the 420 MW coal-fired power plant to wood pellets in the form of a premium paid on top of the market price of the electricity generated, a “Contract for Difference” (CfD). Lynemouth will receive aid until 2027 and, according to UK estimates, generate about 2.3 TWh electricity per year. The plant is due to use about 1.5 million tonnes of pellets per annum

sourced from North America and Europe.

The Commission opened an in-depth investigation in February 2015 to assess whether the terms and conditions of the UK support, and in particular the financial calculations and estimates regarding key cost parameters, would avoid overcompensation. The Commission is now satisfied that the submitted parameters are robust and present no risk of overcompensation nor did it find any evidence of market distortion in the global wood pellets market. It is satisfied that the measures will not lead to undue market competition distortions for other wood-based products.

B183/5135/AS



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Chinese biomass heating boom

Since the China State Council issued the Action Plan on Prevention and Control of Air Pollution in 2013, efforts are being stepped up to replace small coal-fired boilers with alternative sources such as biomass. Huzhou Huanqing Environmental Technology Co., Ltd is one boiler maker seeking to leverage these efforts.

THE MARKET FOR BIOMASS HEATING

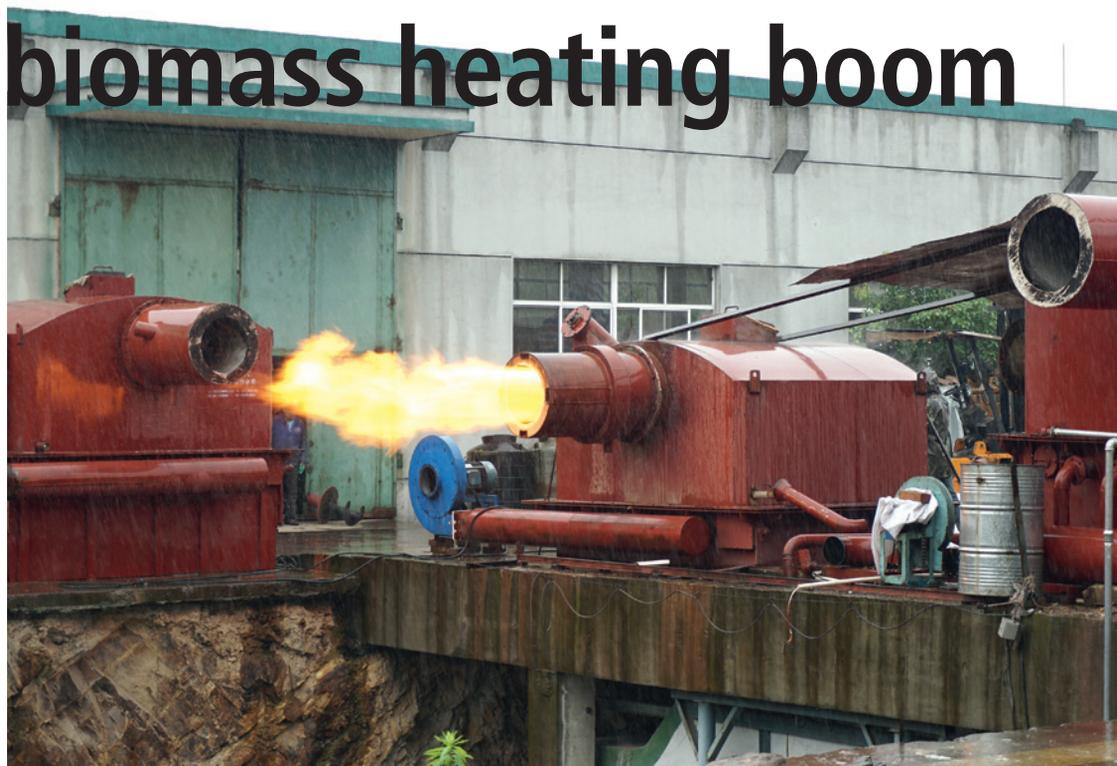
is booming in China with an estimated 420 000 small and medium sized coal-fired boilers needing replacement. The China State Council Action Plan on Prevention and Control of Air Pollution issued in 2013 shows clear advantages in controlling air pollution, reducing greenhouse gas (GHG) emissions and developing the rural economy.

50 million tonnes 2020

The National Energy Administration (NEA) also set a target to build 120 biomass heating demonstration projects during 2014-2015 with a total investment of about CNY 5 billion (≈EUR 0.7 billion). To date, there are more than 200 biomass heating projects across the country. The largest installation consumes 80 tonnes per hour.

Furthermore, in the 13th five-year development plan for biomass energy, the NEA is going to set a more ambitious target, to use 50 million tonnes of wood pellets and biomass briquettes by 2020. More biomass heating projects and increased turnover for technology companies are expected in the coming years.

One company seeking to leverage on this market development is Huzhou Huanqing Environmental Technology Co., Ltd, a leading biomass heating company. Based in Huzhou City, Zhejiang province, which is part of Yangtze River Delta region, it is dedicated to the manufacture of agricultural, forestry and municipal waste equipment. The company is owned by Guande Li, whose family has over 100 years of experience in the charcoal making business through the company Huzhou Fusheng Char-



Fire in the hole - testing a 10 tonne per hour biomass burner from Huzhou Huanqing Environmental Technology Co., Ltd.



Huzhou Changsheng Chemistry Co., Ltd. installed a 6 tonne per hour pellet burner from Huanqing and consume 6 000 tonnes of pellets annually.

coal Co., Ltd (Fusheng). Li has also been devoted to charcoal equipment research and development for over 20 years. Li and his companies have earned a solid reputation for quality and service with clients in China, Thailand, Malaysia, Burma and Indonesia.

Adapted gasification

The company's gasification burner was developed over three years from Fusheng's charcoal making technology. With its unique semi-gasification and double combustion chamber design, the burner can increase thermal efficiency by 10-15 percent and meet air pollutant emission standards more easily, compared to other products on the

market. It was selected for the National Low-carbon Technology Promotion Directory 2015, which means the technology is promoted by China's central government.

In the first combustion chamber the wood pellet is floating in the airflow, semi-gasified and semi-burning. The fire temperature increases to 800-1000 °C, then the hot gas is injected into the second combustion chamber with supplemented oxygen for further burning. The fire in the second combustion chamber reaches 1200-1300 °C through thermal storage. To keep the second combustion chamber at a constant high temperature and avoid coking, it is covered by a special refractory.



Guande Li, Managing Director of Huzhou Huanqing Environmental Technology Co., Ltd.

The starting time for this burner is less than 8 minutes and thermal efficiency is over 90 percent. The dust and sulphur dioxide (SO₂) emissions are below 20 mg per m³ and nitrogen oxides (NO_x) are below 200 mg per m³. This means it meets China's boiler exhaust emission standards.

Currently the burner technology is used in over 10 projects across China, all of which have been running smoothly since commissioning. Guande Li expects to supply many more over the coming years.

Text & photos: Xinyi Shen
B183/5049/AS

“Jenny” - first Vyncke biomass boiler in Sweden

Named “Jenny”, the new 12 MW biomass boiler being commissioned in Insjön, Sweden is a first for Belgian boiler manufacturer Vyncke. It is ready to provide heat for BIODAL, a public-private company jointly owned by energy utility Dala Energi AB and the family-owned sawmill group, Bergkvist-Insjön.

TAKING A YEAR TO BUILD, the new boiler plant is scenically sited by the riverbank at Bergkvist-Insjön sawmill. The 12 MW hot-water boiler will use around 17 000 tonnes of biomass per annum, supplied as dry woodchips and wood waste from the sawmill as well as wood pellets from Falun Energi & Vatten AB.

– The original idea was to install a pellet-fired boiler, but when we took in quotes, we saw that there was a boiler on the market that could manage both pellets and dry wood chips. Using dry chips from the sawmill and pellets, we cut unnecessary transportation and reduce carbon emissions, said project manager Per Brandes.

Supplied by Belgian company Vyncke the boiler is designed to meet the new EU medium combustion plant (MCP) directive on emissions that come into play 2020.

– It has a long residence time in the combustion chamber, more than 2.5 seconds at full load, and a completely water-cooled grate, said Per Brandes.

Another key feature is the ability to peak the boiler output to 15 MW with pellets, a necessity in extremely cold weather, at 35 °C or lower. The ash left from the boiler will be used as filler ma-

terial in construction by the sawmill.

The new flue gas cleaning technology enables a radical reduction in particulate matter (PM), from 250 mg to 20 mg/Nm³ at 13 percent CO₂, compared with old boilers when multi-cyclone filters are replaced with electrostatic precipitators (ESPs).

– Together with other upgrades and renovation that we have carried out at our own boiler at the sawmill, this venture means we have stable hot water production for the next 15-20 years, said Peter Eklund, CEO at Bergkvist-Insjön.

Public-private partnership

The new boiler will ensure the heating supply needed for the dry kilns at the sawmill as well heat households in Insjön via the district heat network. The background to the project is that both Dala Energi and Bergkvist-Insjön had aging boilers that needed replacing. Two years ago the companies formed BIODAL, a jointly owned company that invested over SEK 35 million (EUR 3.8 million) into the new biomass heat plant.

– The idea came about when we found a common business opportunity that could make both companies more competitive while benefiting the environment. This is a good example of how an energy utility and forest industry can collaborate, said Hans Bywall, CEO for Dala Energi AB.

Dirk Vyncke, pater familias, for Vyncke, had traveled to Insjön to be present at the inauguration. This is the first boiler the company has supplied to Sweden.

– It is inspiring to see this collaboration between a public sector company and a completely



(Left): Peter Eklund, CEO, Bergkvist-Insjön, Dirk Vyncke, Pater familias, Vyncke, Per Brandes, Project Manager and Hans Bywall, CEO, Dala Energi.

private company. It has given me new ideas that I take home with me, said Dirk Vyncke.

After test-firing the boiler was named “Jenny” the name day name for the inauguration by local councillor Ulrika Liljeberg. The tradition of naming boilers is something that project manager Per Brandes has taken with him from when he worked in the Baltic countries during in the 1990s.

– I have taken up the tradition and always suggest that new boilers be named with a female name, said Per Brandes.

B183/5121/AS

Finnish first for stationary grinder

The Finnish energy utility Vaskiluodon Voima Oy has recently inaugurated its new biomass receiving and pre-treatment station at its combined heat and power (CHP) plant in Vaasa, western Finland. The new receiving station is part of its coal-to-biomass conversion project to utilise local forest-based resources.

The new biomass grinding system was supplied by US-based CBI (now a Terrex brand) and consists of a 8400 stationary grinder with 1000 kW electrical main drive with additional in-line disc screener to screen out overs. The 95 tonne unit has a production capacity of 120 tonnes or 400 m³ per hour.

The unit is designed to process roundwood, stumps and logging residue, which is sourced locally and supplied by truck.

A 15 meter long discharge conveyor delivers



A happy trio at the inauguration of the first installation of CBI stationary grinder at a European biomass power plant, Laurens Veer (left) Ulf Österoos, and Anders Ragnarsson.

the product on a 120 meter long transit conveyor up to the 24 meter high tie in of the silos.

B183/5083/AS

Biomass ORC to UK garden centre

US-based provider of distributed, waste heat to power generation plants ElectraTherm, has shipped the first Power+ Generator 6500 to a garden centre in the UK. Scheduled for commissioning in early 2016, the site will use woodchips to generate clean electricity. ElectraTherm utilizes Organic Rankine Cycle (ORC) and proprietary technologies to generate power from low temperature heat at 119°C. The 110 kWe Power+ acts as a combined heat and power (CHP) unit with excess heat from the condensing side to be utilized for heating the garden centre, as well as drying the biomass fuel to a lower moisture content to increase the Arterm Bio Boiler’s efficiency. The boiler heats water to run the Power+ Generator, and produces clean electricity that is sold back to the National Grid.

B183/5140/AS



– Turboden has over 300 ORC units under construction or in operation worldwide said Ilaria Peretti, North American Sales & Business Development Manager during WPAC in Halifax. Most are biomass applications.

Turboden to supply UK's largest biomass ORC unit

Italy-based Organic Rankine Cycle (ORC) technology developer and supplier Turboden, a company within Mitsubishi Heavy Industries (MHI), has announced it was selected to supply a 6.5 MW power only ORC unit for a biomass heat plant in Sheffield, UK. Kantor Energy Ltd., a design, engineering and building contractor specialised in district heating systems and principal EPC contractor for the project, selected Turboden Srl to supply a 6.5 MW ORC turbo-generator with air condensers.

The plant will be built on a brownfield site in Holbrook Industrial Estate and utilise around 55 000 tonnes per annum of construction and demolition (C&D) wood as fuel. Turboden's ORC unit will generate more than 6.5 MW of electricity and the facility will supply heat to the local district heat network.

Once in operation, the plant will sell electricity to GDF Suez UK under a long-term off-take agreement. Veolia Energy Services Ltd has been awarded the long-term operation and maintenance contract on behalf of Equitix, whose services involve delivery and managing infrastructure projects from bidding and closing through to construction and service provision. The project has received £30 million in funds from the UK Green Investment Bank (GIB) and Equitix.

B183/5107/AS

MARKING 50TH ANNIVERSARY WITH EUR 12 MILLION INVESTMENT

Austria is regarded by many as home to some of the world's top manufacturers and providers of biomass fired energy plants. Celebrating 50 years of business, family-owned Polytechnik Luft- und Feuerungstechnik GmbH, is one such company.

OVER THE LAST FIVE DECADES, Austria-based Polytechnik Luft- und Feuerungstechnik GmbH has moved from manufacturing vacuum and filter equipment to becoming one of the world's leading suppliers in the design and manufacture of turnkey biomass incineration plants for heat and power. At the same time it has grown from a small business with only two employees in Triestingtal, Lower Austria into a global corporation that supplies incineration plants from 300 kW to 30 MW single-boiler capacities. Polytechnik offers specially developed incineration systems with a range of media carriers depending on the type and moisture content of the fuel and thermal end-use.

Investing for the future

The company is systematically preparing itself for the next stage of growth. At a recent function marking the company's 50th anniversary, Polytechnik Group announced plans to invest EUR 12 million into the expansion of its four ISO 9001-certified European production plants. In doing so, the owners are making a clear commitment to



(Left): Wolfgang Sobotka, Deputy Governor of Lower Austria, Leo Schirnhöfer and Lukas Schirnhöfer, Polytechnik Luft- und Feuerungstechnik GmbH, Hans-Jörg Schelling, Austrian Minister of Finance.

Austria as their main location, and to industrial production in Europe.

– We expect that global economic trends will stabilise, and accordingly, we are planning to invest EUR 12 million in industrial production in Europe by 2020, revealed Leo Schirnhöfer, company head and majority owner.

The international growth plan that Polytechnik started about 25 years ago is the reason for the company becoming a global player today. Pursuit of energy independence by major industrial groups is a key driver of its business model and valued clients include Europe's largest aircraft manufacturer, British protein manufacturers and Russian wood processing companies: companies which themselves dominate world markets.

– You can find our plants anywhere around the world from New Zealand to Siberia. As partners in technology development, we help customers put the energy supply of their production onto a carbon-neutral basis, said Schirnhöfer.

The company intends to counter the recent downturn in growth of its established markets by opening up new export markets.

– We are building a strong global presence in order to establish our approach to biomass energy production even more firmly in our core markets. Export and systematic innovation are our only chance of safeguarding highly skilled jobs in Austria, said Schirnhöfer.

Succession and ownership continuity ensured

While the number of employees has increased over a hundredfold over the last four decades, the family spirit has remained strong throughout. Two generations Schirnhöfer are at the helm, majority shareholder Leo Schirnhöfer together with his son Lukas.

– We define the term 'family' quite broadly, remarked Leo Schirnhöfer during the function adding that key managers who have systematically built their de-

partments to their current size have shares in the company.

Twenty-five or 30 years' service are common at Polytechnik and typify the company's long-term focus on its corporate culture.

– Continuity and reliability are very important for Polytechnik customers as a customer relationship begins when we commission a plant that we have delivered, and continue when we maintain it later on. We have carefully prepared for the arrival of coming generations at the company's top management. Sustainability is more than just a technological or ecological concept, remarked Schirnhöfer.

Investing in research & development

In order to be at the leading edge of technology, Polytechnik plans to invest between 2.5 and 5 percent of its annual earnings in research and development.

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Text: Alan Sherrard

Photo: Conny de Beauclair

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Biomass handling on the radar

As an equipment manufacturer with over a century of experience in crushing, processing, feeding, conveying and storing of bulk materials, Jeffrey Rader has, it seems, remained under the radar for the biomass to energy sector. A “better kept” secret is a more accurate description as over the years it has supplied specialist processing, handling and conveying equipment to number of high profile biomass power and pellet plant projects such as Drax Power in the UK, Dominion Power and Green Circle (now Enviva Biomass) in the US and OPG Atikokan in Canada to mention a few.

FOR THOSE IN THE COAL, mining, power generation and pulp and paper industries Jeffrey Rader is a household name. The company was formed in 2009 when Jeffrey Specialty Equipment (JSE) joined forces with Rader and since 2013 it operates as a dedicated material handling and processing brand for the energy, recycling, forest and wood products industries under TerraSource Global.

Mining and forest industry heritage

Tracing its roots back to 1876, JSE began with developing crushing and screening equipment for the coal and mining industry. It has been providing waste wood (hog) and bark fuel equipment and systems for the pulp and paper industry since the 1890's. Rader on the other hand developed one of the first pneumatic conveying systems for woody materials in the 1950's. Back then it was an innovation that revolutionised bulk handling in the pulp and paper industry worldwide.

– Prior the merger in 2009 both companies were successful in the mining and the forest product industries and these are still very important to us. At the same time we recognise that the broader biomass sector has probably the greatest potential for future growth. For instance our pneumatic boiler feed systems for biomass co-firing or conversions in pulverised coal (PC) power plants, said Siniša Jakšić, European Managing Director.

Having clocked 30 years of service with the company, many as design engineer, Jakšić is well positioned to reflect on where the company has been, where it is now and where it might be heading. He outlined three main areas that Jeffrey Rader's equipment, experience and expertise come into their own; industrial and utility boiler fuel preparation and feed systems both mechanical and pneumatic; bark/wood/agricultural residue fuel shredding and screening systems for industry and finally resource recovery and waste to energy.

No-knife re-chipper

It makes sense as over the years the company has amassed an impressive arsenal of product offerings geared for biomass preparation and handling including truck dumps, receiving stations, size reduction and screening, conveying, storage and reclaim, boiler feed systems and pneumatics. One item from the comprehensive listing seems to be missing, a chipper.

– It goes back to the coal and mining part of our heritage, knife tools aren't used for obvious reasons, remarked Jakšić adding that while a chipper may be missing from the repertoire, it was not missed.

– There are plenty of chippers out there that can convert a log into chips for the pulp, board and pellet industries. Our primary focus in the biomass and forest products sector is to utilize our core know-how with crushers, shredders, grinders and hammer mills to process the residues such as bark into fuel or screen and re-size oversized chips, he explained.

The latter, a “no-knife re-chipper”, was developed by Jeffrey in 1996 in response to pulp and paper industry concerns over high maintenance costs for typical re-chippers, is a good example.

– During chipping as the knives dull and wear, you get increasing proportions of non-spec sizes ‘overs’ and/or pins and fines. Our patented slow speed “Chip-sizer” re-sizes the oversize chips while minimising pins and fines, and allows you to put them back into the process. We see recovery accept rates in the region of 85-95 percent. A low capital cost piece of machinery the payback time is typically within a year, often a matter of months depending on the volume of chips, said Jakšić.



Duo with a solid background in material handling, Siniša Jakšić, European Managing Director, Jeffrey Rader (left) and Göran Forsberg, CEO, Main Engineering.

Tube feeding

A more recent addition that is making a name for itself both in the forest- and biomass industries is the innovative TubeFeeder reclaim solution. Pioneered and patented by Swedish company Main Engineering AB, it is, with the exception of the UK and Japan, licensed to Jeffrey Rader.

– There are over 100 Tube installations worldwide since it was first introduced in the late 1900's. The majority of these are at pulp and paper mills. However the last couple of years have seen tremendous interest in industrial biomass heating installations, particularly in France, but also the UK and now Japan, said Göran Forsberg, CEO, Main Engineering.

An under-the-pile system the TubeFeeder has a number of inherent advantages over other screw reclaim systems or crane solutions for biomass. It is composed of an outer tube with uniformly spread and identically sized slots. The tube rotates at 1-10 rpm and is reversible. The slots are furnished with activators, which reclaim material into the tube along its length when it rotates. Inside the tube is a screw auger with a fixed rpm that carries the material out to an external conveying system. This means that both the screw auger and the material being conveyed are protected from the static pressure exerted by the remaining material in the pile.

– This is a key feature as it means at least 70 percent less energy and power is required to reclaim the material compared to a conventional exposed screw system while minimising equipment wear and product degradation. Furthermore it enables true first-in first-out and full homogenization of the reclaimed material, said Forsberg.

The reclaim rates can be adjusted using variable frequency drives to within a 15 to 100 percent range of maximum reclaim capacity.

– The feed rate is uniform and a linear function of the tube rotation. Together with the homogenization of the reclaimed material this results in improved overall boiler performance efficiency, Forsberg explained adding that this revelation is a key reason for the surge in interest in France.

– Plant owner and operators have understood the advantage of taking a holistic view over the entire fuel quality, storage, reclaim, boiler feed and boiler performance treating it as one, ended Göran Forsberg.

*Text & photo: Alan Sherrard
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Turning waste into fuel

- and new livelihood opportunities



A collaborative project in Addis Ababa, Ethiopia, offers crucial insights on the challenges of transforming household cooking fuel markets.

SAMRAWIT (NOT HER REAL NAME) IS 36, a widow, with four children. She lives about 14 km outside Addis Ababa, in Ethiopia, and earns about Birr 30 (US\$1.5) per day collecting firewood for sale. She cooks with firewood herself, and has chronic respiratory problems, along with back pain from her work.

Across Ethiopia, 92 percent of households cook with wood and other biomass, with severe consequences for public health and the environment. Policy-makers and non-governmental organisations (NGOs) alike see a transition to modern stoves using clean fuels, such as ethanol, as top priority. Yet the supply of such fuels is unreliable, and there are concerns about the impact on communities. How would women like Samrawit handle the transition?

It is this dilemma that led Stockholm Environmental Institute (SEI) to launch “Fuel from Waste: Demonstrating the Feasibility of Locally Produced Ethanol for Household Cooking in Addis Ababa”, a project in collaboration with the Gaia Association and the Ethiopian government with financing from the Nordic Climate Facility and the World Bank.

Ethanol for cooking

The project set out to test the technical, financial, environmental and socioeconomic feasibility of producing ethanol for cooking on a small scale, using decentralized micro-distilleries. The idea was to provide a new livelihood opportunity for women like Samrawit, who would sell ethanol instead of wood – and in the process, increase the availability of ethanol for cooking in Addis.

– It is widely acknowledged that we need to move away from smoky biomass cookstoves, but what is not very clear is how transition to clean

fuels can be achieved. We have worked a lot on the demand side of clean cooking, but not on the supply side. We saw this project as a chance to better understand what it takes to achieve this transition, said Caroline Ochieng, project leader and SEI Research Fellow.

The project built on the Gaia Association’s 10 years of experience promoting ethanol as a clean cooking fuel in Ethiopia. Gaia has distributed roughly 8 000 ethanol-fuelled “Clean-Cook” stoves in the country, mostly in refugee camps, and has demonstrated that the stoves reduce indoor air pollution to below the thresholds recommended by the World Health Organization (WHO). The stoves can also help avoid up to three tonnes CO₂e per year of greenhouse gas (GHG) emissions.

Addressing fuel supply

Yet Gaia and others promoting ethanol for cooking in Ethiopia have faced several supply challenges. For instance, in 2010–2011, the sugar companies from which they bought ethanol sold it for transport fuel blending instead. This led some households already using ethanol for cooking to switch back to biomass.

At least as important as a reliable ethanol supply was the chance to provide new livelihood opportunities for women like Samrawit. The partners thus teamed up with the Former Women Fuelwood Carriers Association (FW-FCA), which has more than 4 000 members who, with government and donor support, have been engaged in activities ranging from weaving and milling, to selling ethanol from the sugar companies.

The idea was to set up a micro-distillery that would be community-owned and -run. Not only would the women earn income from the plant, but also learn valuable skills through training in various operational aspects of the plant, as well as business skills.

A long-awaited opening

The plant was inaugurated on 8 October. It has the capacity to produce 1 000 litres of ethanol per day, enough to meet the daily cooking fuel needs of 1 000 households. The ethanol will be made from wastes such as (blackstrap) molasses, a by-product of sugar production, or potentially also from discarded fruit and vegetables from nearby markets. At the inauguration, guests and project participants were able to see the equipment at work, a preview of what they hope will be a successful venture.

The plant is near middle-income condominiums, a large potential market for the fuel produced. Although these households have electricity, frequent power outages lead them to combine electric cooking with kerosene stoves. The ethanol would provide a cleaner alternative. Getting to this point, however, took more time and effort than expected. There were challenges acquiring the land and obtaining necessary permits for importation and eventual installation of the plant equipment. To operate, the plant still needs to have recycling facilities set up for the wastewater, as well as an electrical grid connection and a laboratory to monitor the quality of fuel produced. Moreover, a support system will be needed to help the women with running the facility.

Leveraging implementation

The partners have proposed a second phase for the project to address those issues and draw further lessons from the implementation.

– These are aspects that would not be possible to tackle within the timeframes that most funders provide for these types of projects: generally two years. Through this project, we have come to appreciate the complexity of the fuel transition process, and identified many new research questions related to land use, ownership and other logistical challenges that will be part of a transformation agenda moving forward in Ethiopia, said Ochieng.

– SEI is not typically engaged in implementation projects, but in this case we wanted to move beyond research and be part of the delivery of a renewable energy production facility, to learn about the challenges on the ground, said Jakob Granit SEI Deputy Director who attended the inauguration with Ochieng and echoed her assessment of the value of this pilot project.

Ethiopia’s current five-year plan for the energy sector includes ambitious targets to disseminate biomass-saving stoves, domestic biogas digesters, biofuel stoves, and solar cookers. There are also plans to introduce more ethanol micro-distilleries. The lessons learnt will be useful for the government and for others aiming to try similar approaches in Ethiopia and beyond.

– The spirit of entrepreneurship and the team effort to realize this facility cannot be overestimated. We are eager to draw out lessons to inform future efforts, concluded Jakob Granit.

*Text & photos: Sarah Odera
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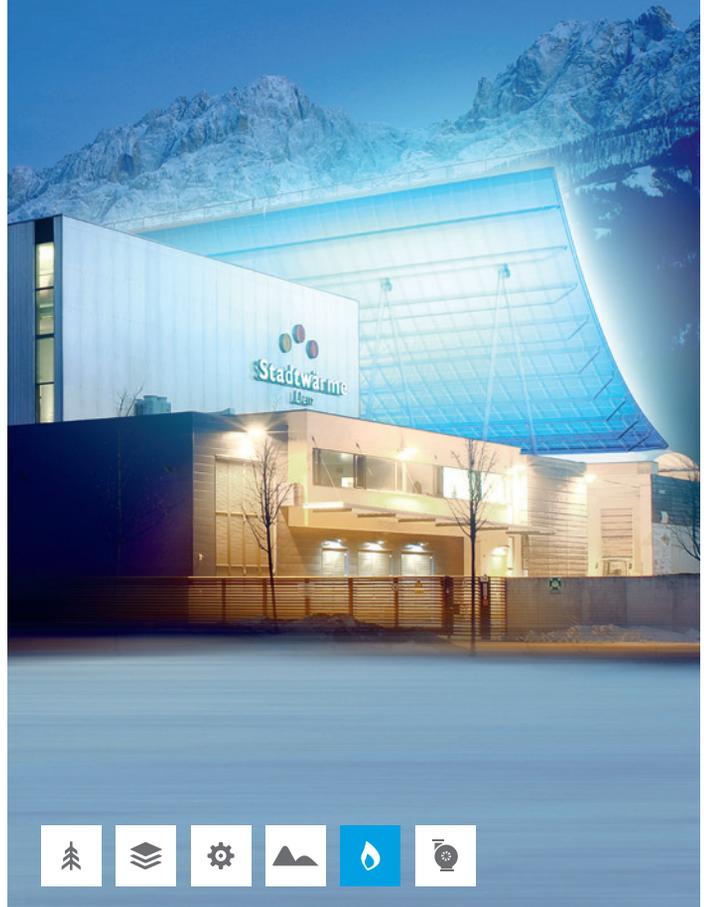
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Global ethanol markets in recovery



Pannonia Ethanol, a subsidiary of Ethanol Europe Renewables maize-to-ethanol plant in Dunaföldvár about 80 km south of Budapest. The largest plant in Hungary it will produce 450 million litres ethanol per annum (see Bioenergy International no.2/2015).

Fuel ethanol production remains concentrated to the USA, Brazil and EU, but biofuel blending mandates are now in place in around 60 countries around the world.

EXACTLY THE SAME NUMBER of countries was represented at the 18th F.O. Lichts Annual World Ethanol Conference held in the Hungarian capital Budapest at the beginning of November.

Over 500 industry and ethanol executives from Europe, Asia and the US gathered in Budapest, Hungary. Well organized, the event covered perfectly the latest developments in ethanol production optimisation, distiller's grains, co-products, product diversification, unlocking C5 and C6 sugars, pre-treatment and advanced biofuels. It also offered an exclusive opportunity to analyse the latest data from international producers, (bio) technology companies and traders to maintain a competitive edge and examine the impact of regional policy and trade barriers on the development of biofuels, and ways to manage these to take the industry forward.

Fuel and feed player

– Ethanol plays an important role in the diversification of energy sources in relation to external environment. Hungary produces a significant

amount ethanol. We produce around 14 percent of the European total production of ethanol. The domestic production of ethanol and biofuels contributes to our GDP with almost one percent. We are therefore greatly supportive the objectives set by the European Union (EU) in order to achieve sustainable development goals, said László Szabó, Hungarian State Secretary of the Ministry of Foreign Affairs in his welcome address.

He referred to the recently expanded and largest Eastern European ethanol plant, Pannonia Ethanol. At full capacity it will produce 450 million litres of ethanol per annum, using GMO-free (i.e. non-genetically modified organisms) Hungarian maize feedstock. Szabó mentioned that GMO-free feed is one of the most important issues for the Hungarian Government during the current free trade (TTIP) negotiations between the EU and US.

Recovering markets

As usual Christoph Berg, Managing Director, F. O. Licht set the scene by presenting the global outlook for ethanol production, consumption and trade.

– The global production of ethanol has stabilised after a minor reduction 2012 and 2013. During this year the European ethanol market has pushed

prices to two-year highs, Berg said.

With 1.18 billion liters of production France was the top ethanol producing EU member state last year. Germany was the top consumer of ethanol last year, with 1.48 billion liters, followed by the UK, France, Spain and Italy. In the Netherlands, ethanol supplies remain so constricted that prices have run up to fresh two-year highs. Limited imports remain the cause of the supply challenge paired with major European production remaining offline for now. Milling wheat, feed wheat and corn crushing margins all remain well over EUR 100 per tonne. Extreme tightness of ethanol supply in Rotterdam is expected to continue in the very short term, but prices are likely to weaken in the medium term, conference sources said.

October statistics from the US Energy Information Administration (EIA), released just days prior the event, showed US ethanol production had increased by 13 000 barrels to 982 000 b/d the highest level in 17 weeks. Stockpiles had also increased, rising by 80 000 barrels to 18 854 million barrels. Ethanol exports from the US recovered during the autumn from a fall in August, with shipments expanding 20 percent to 60.3 million gallons (mg), according to the Renewable Fuel Association (RFA) analysis »



László Szabó, Hungarian State Secretary of the Ministry of Foreign Affairs, underlined support of EU's sustainable development goals.



According to Christoph Berg, Managing Director of F.O. Licht, global ethanol production has stabilised after a minor decrease 2012 and 2013.



Douglas Durante, Executive Director, Clean Fuels Development Coalition, urged air quality officials to reexamine assumptions used in determining tailpipe emissions.



Ruta Baltause, DG Energy, spoke on upcoming biofuel GHG emission thresholds.




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Biofuels GHG emissions offsets significant, new GRFA report finds

Canada-based Global Renewable Fuels Alliance (GRFA), a non-profit organization dedicated to promoting biofuel friendly policies internationally and representing over 90 percent of global biofuels production in cooperation with (S&T)2 Consultants Inc., an internationally renowned energy and environmental consulting firm, have released a new report “Green House Gas (GHG) Emission Reductions from World Biofuel Production and Use for 2015.”

Released during the COP 21 in Paris, France the report found that year after year the reduction in global GHG emissions from global ethanol production and use is increasing. The total GHG emission reductions forecast for 2014 is 169 million tonnes carbon dioxide (CO₂) equivalent, which is bigger than the total GHG emissions in 28 Annex 1 countries.

– Biofuels like ethanol are the only cost-effective and commercially available alternative to crude oil and are proven to reduce harmful GHG emissions and help in the fight against climate change. There needs to be stronger policies to increase their use globally, said Bliss Baker, President of the Global Renewable Fuels Alliance.

The report also includes production scenarios for 2030. Based on a conservative annual growth rate of 2.8 percent biofuel production and use emission savings could increase from 168.9 million tonnes per year in 2014 to 264 million tonnes CO₂ equivalent in 2030. This represents a 56 percent increase in GHG emission reductions.

– This report sends a clear message to policy makers around the world that while the GHG emission reductions currently being delivered by biofuels are substantial, the sector can deliver much more, concluded Baker.

Editor's note: The report is available from www.globalrfa.org

B183/5138/AS

Season's Greetings

As the 2015 bioenergy year draws to a close, we would like to wish everyone a safe and reflective Festive Season while looking forward to a peaceful and prosperous 2016.



Cont. from 27

of government data released during conference.

Canada held on as the top export market with 26.2 mg (44 percent) of US ethanol crossing the border. Meanwhile, India imported 14.3 mg (24 percent) in September 2015, its highest level of imports since February, while exports to Brazil were close to zero. Total year-to-date US ethanol exports reported in Budapest were 624.9 mg. This is a 6 percent increase compared to this time last year and already greater than total exports in 2013. Year-to-date shipments indicate an annualized rate of exports of 833 mg.

Low risk ILUC

Ruta Baltause from the European Commission (EC) Directorate General (DG) for Energy explained several new directives for greenhouse gas (GHG) savings. Minimum GHG emission thresholds are increased to 60 percent for new installations starting physical production of biofuels after 5 October 2015.

– The estimated indirect land-use change (ILUC) emissions are included in the fuel suppliers and commissions reports in both Directives but no ILUC factors in the sustainability criteria or for the Fuel Quality Directive (FQD) 7a accounting are changed, Baltause said.

The new thing, according to Baltause, is so called “low risk ILUC” biofuels and bio-liquids. The definition and EC reporting shall be fulfilled by 2017 on possibility for identification and certification. There will also be change in procedure for the GHG emission calculation method-

ology for both fossil- and biofuels.

Incorrect assumptions

So-called “flex-fuel” vehicles can run on blends of ethanol up to 85 percent (“E85”). These vehicles have been sold for more than a decade—more than 15 million are on the road today—but up to now have not run on ethanol very often.

– Both in the EU and the US, the focus should be on providing cleaner, low carbon octane to help meet health, climate and efficiency goals, underlined Douglas Durante, Executive Director from Clean Fuels Development Coalition.

Durante said that in the light of continuing detections regarding the Volkswagen emissions problems, this scandal should lead air quality officials around the world to look closer at, often incorrect, assumptions and calculations used in determining emissions.

– Furthermore, a better understanding of the importance of looking at fuels and vehicles as a unified system would tell a far more encouraging story than what many current and outdated models would indicate, Durante specified.

He said that regardless of the misinformation spread by the petroleum industry, ethanol is a superior fuel and additive to anything out of the oil barrel. Gasoline is a mix of hundreds of different chemicals and hydrocarbons, the worst of which are the toxic, often carcinogenic aromatics.

– The US Environment Protection Agency (EPA) is actually obliged to reduce these risky components in the US and if we were allowed to splash

blend additional volumes of ethanol, we would be able to improve fuel quality and protect public health, explained Doug Durante.

Despite the challenges facing the biofuels industry in regard to political and public support, solutions exist, said Durante, which can easily overcome the imaginary blend wall.

– The value of ethanol in reducing carbon emissions while providing the octane they need is persistently acknowledged by auto industry, Durante said.

Encouraging consultations among the ethanol, agriculture and auto industries as well as the US Departments of Energy and Agriculture are, according to Durante, focusing on blends of 25, 30 and even 40 percent in the coming year. He also noted hundreds of millions of dollars are being invested in the fuelling infrastructure and the industry is working to provide consumers with choice by creating access to the market.

– With vehicles that can use ethanol and through the capability to distribute the fuel, the potential is nearly unlimited for both first- and second generation fuels. To oppose these programmes means lost market shares to the petroleum industry, which admittedly funds the opposition we see in all of our countries. Working together we can tell the facts and how biofuels provide a wealth of environmental, energy and economic benefits, underscored Doug Durante.

US EPA announces RFS renewable volume obligations

The US Environmental Protection Agency (EPA) released its final Renewable Fuel Standard (RFS) renewable volume obligations (RVOs) for 2014, 2015 and 2016 that refiners have to meet in blending biofuels with gasoline.

The agency increased the blending requirements across the board, to a total of 18.1 billion gallons, including 14.5 billion gallons of undifferentiated biofuels or corn ethanol and 230 million gallons of cellulosic ethanol.

Under the new RFS rule, Biomass-based Diesel volumes would grow to 1.9 billion gallons in 2016 and 2 billion gallons in 2017. The Biomass-based Diesel category – a diesel subset of the overall Advanced Biofuel category – is made up mostly of biodiesel but also includes renewable diesel, another diesel alternative made from the same feedstocks using a different technology.

BI83/5129/AS

Text & photos: Markku Björkman
BI83/5111/AS

DuPont inaugurate world's largest cellulosic ethanol plant

Global chemical major US-based DuPont has officially opened its US\$225 million commercial-scale cellulosic ethanol plant in Nevada, Iowa, USA. The plant will convert corn stover (corn cobs, leaves and stalks) to 30 million gallons (mg) of fuel-grade ethanol annually making it the world's largest such facility to date.

DuPont is collaborating with more than 500 local farmers to gather, store and deliver 375 000 dry tons of corn stover each year, harvested from 190,000 acres of farmland within 30 miles of the plant. Proximity to Iowa State University and DuPont Pioneer research locations enables further research, collaboration and innovation and the plant's fully integrated end-to-end production system will be

available to license globally.

DuPont recently announced its first licensing agreement with New Tianlong Industry to build China's largest cellulosic ethanol plant, and last fall a Memorandum of Understanding (MOU) was announced between DuPont, Ethanol Europe and the government of Macedonia to develop a biorefinery project. The company also is working in partnership with Procter & Gamble to use cellulosic ethanol in laundry detergents.

DuPont celebrated the opening of the Iowa facility on October 30.

– Today, we fulfill our promise to the global biofuels industry. Cellulosic biofuel is joining ranks with wind and solar as true alternatives to fossil fuels, said William F. Feehery,



President of DuPont Industrial Biosciences.

The majority of the fuel produced at the Nevada facility will be bound for California to fulfill the state's Low Carbon Fuel Standard.

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Joule and Red Rock plan merger

US-based companies Joule, a developer of liquid fuels from recycled carbon dioxide (CO₂), and Red Rock Biofuels, a leading developer of renewable jet and diesel fuel bio-refineries, have announced their intent to merge. Red Rock adds Fischer-Tropsch technology to convert biomass residues into jet fuel and diesel products to Joule's Helioculture technology. Red Rock is poised to begin construction of its first refinery located in Lakeview, Oregon in early 2016.

BI83/5112/AS

SG Preston and IHI E&C in biofuel plant roll-out deal

US-based companies, SG Preston, a bioenergy company, and IHI E&C, an engineering, procurement and construction (EPC) subsidiary of IHI Corporation, have announced an agreement for a Multi-Facility Program that will include the development and construction of a series of commercial volume, advanced biofuels manufacturing plants in the US Midwest and Canada.

The plants will use proven, commercial scale technologies for the production of renewable diesel and jet fuel targeting US and global industries.

According to a statement IHI E&C will serve as turnkey EPC to SG Preston's biofuels initiative, delivering "lump sum," fixed price engineering and construction.

SG Preston will deploy its biofuels strategy initially at five plants (South Point and Van Wert Ohio, Logansport, Indiana, and two additional, sites, one in Michigan, and one in Ontario, Canada), each with an initial capacity to produce 120 million gallons of renewable diesel and jet fuel annually.

BI83/5072/AS



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Gevo and Praj sign licensing and development deals

US-based advanced renewable fuel and biochemical platform technology company, Gevo Inc., has announced that it has entered into a license agreement and a joint development agreement with India-based ethanol plant engineering, procurement and construction (EPC) provider, Praj Industries Ltd, to enable licensing of Gevo's isobutanol technology to processors of non-corn based sugars, including the majority of Praj's global client base of ethanol plant owners. Praj will invest in the development and optimization of Gevo's isobutanol technology for use with non-corn feedstocks including sugarcane,

sugar beet, cassava, rice, sorghum, wheat and certain cellulosic sugars. This is anticipated to lead to process design packages ("PDP") that would be expected to accelerate the licensing of Gevo technology to users of these feedstocks. The duo will also work to commercialize Gevo's technology for making renewable jet fuel from isobutanol in India. Gevo and Praj expect to license up to 250 million gallons of biobutanol capacity over the next ten years under this partnership.

B183/5080/AS

Abengoa hit financial turbulence

On November 25 Spain-based energy and environment technology developer, Abengoa, notified Spanish securities market commission that it intends to apply for article 5 bis of the Spanish insolvency law. The company, which only two days prior announced winning a major contract for a power plant in Jamaica, cited termination of a framework agreement by one of its major creditors, Gonvarri Corporación Financiera. The company will have four months to reach an agreement with its creditors. Abengoa have numerous projects including advanced biofuels.

B183/5131/AS



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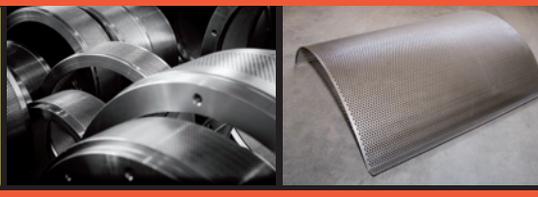
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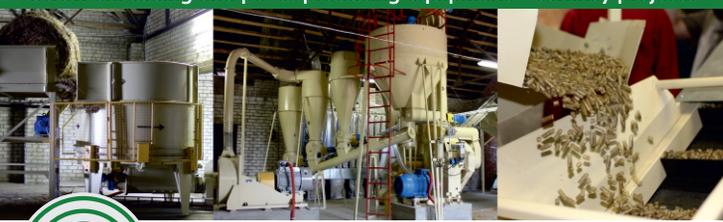
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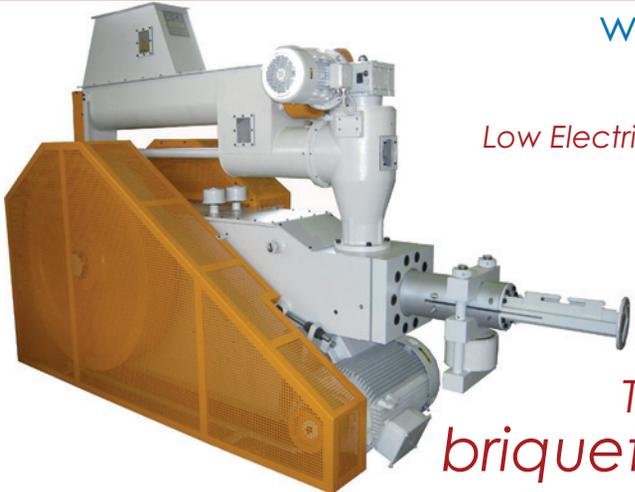


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TURNING OIL TANKERS AND JUMBO JETS

A recently published scientific study has concluded that, if left unchecked, maritime transport and aviation collectively could account for almost 40 percent of global carbon dioxide (CO₂) emissions by 2050. Setting reduction targets for both sectors would provide clear signals for all and contribute to improving investment perspectives.

COMMISSIONED BY THE EUROPEAN Parliament's Committee on Environment, Public Health and Food Safety (ENVI) and published in November in the lead up to the climate talks in Paris, France, the study "Emission Reduction Targets for International Aviation and Shipping" finds that, if left unregulated, maritime transport and aviation could be responsible for around 17 percent and 22 percent respectively of global CO₂ emissions by 2050.

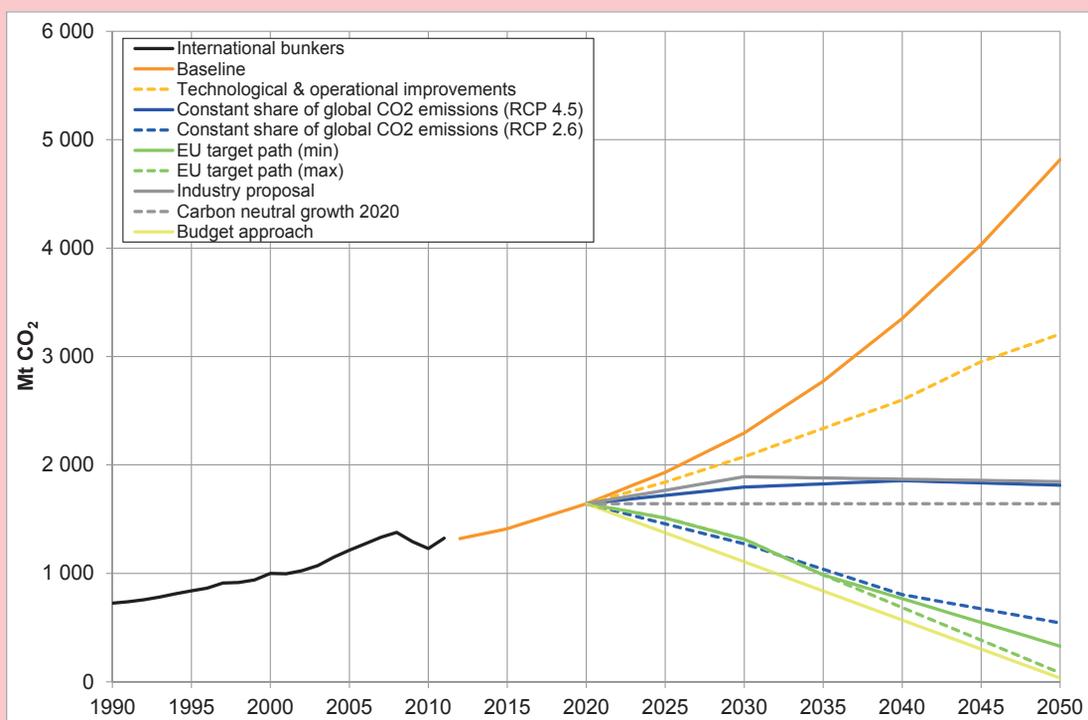
According to the study, both sectors together accounted for about 3 to 4 percent of global emissions 2012 depending on whether global greenhouse gas (GHG) or only CO₂ emissions are considered.

Own actions insufficient

Initiatives and actions taken by the International Maritime Organisation (IMO) and the International Civil Aviation Organisation (ICAO), both United Nations (UN) agencies that regulate these sectors and tasked by the Kyoto Protocol to address GHG emissions, started late and have been "insufficient from an environmental perspective." The study agrees that the measures proposed by IMO and ICAO thus far will mitigate growth of the sectoral CO₂ emissions but that in the long run these will not lead to absolute emission reductions. This is due to the historic and projected strong growth for international transportation. CO₂ emissions of international aviation and maritime transport were and are constantly growing despite considerable efficiency improvements.

The study warns that if, as in the past, the ambition of these sectors continues to fall behind efforts in other sectors and if action to com-

Figure 11: Potential CO₂ emission targets for international aviation and maritime transport



Source: Study authors' own calculations based on IEA 2014, ICAO 2013b, IMO 2009, IMO 2014, van Vuuren, D. P. et al. 2011, Thomson et al. 2010, IATA 2013, IPCC 2014, ICAO 2010, ICS 2015.

Representative Concentration Pathways (RCP), is a set of global GHG emission trajectories used in the climate models. The global carbon budget approach is an alternative to emission pathways: it determines the total aggregated emissions since pre-industrial times without using a specific target path.

Constant share (blue lines): the assumption is that the share of global GHG emissions from international aviation and maritime transport projected for 2020 is kept constant in the future.

EU target path (green lines): the assumption that international aviation and maritime transport could be considered as additional countries and that they resemble an industrialised rather than a developing country.

Budget approach (yellow line): Taking up the concept of a remaining global carbon budget together with international aviation and maritime transport's 2020 share in global GHG emissions.

Carbon neutral growth (dashed grey line): ICAO has agreed to keep its CO₂ emissions constant from 2020 on.

Industry proposals (continuous grey line): IATA suggested starting with carbon neutral growth from 2020 onwards and reducing international aviation's emissions by 50 percent by 2050 compared to 2005.

bat climate change is further postponed, their collective share in global CO₂ emissions may rise substantially to almost 40 percent.

Staying within 2°C

Based on several criteria, potential mitigation targets for the aviation and shipping sectors were developed and presented in the study. They range from a somewhat reduced increase of future emissions over stabilisation at 2020 levels to a full decarbonisation of those sectors by 2050. While acknowledging that full decarbonisation within only 30 years is rather unrealistic, the study shows that stabilising emissions at 2020 levels (carbon neutral growth) is clearly not enough.

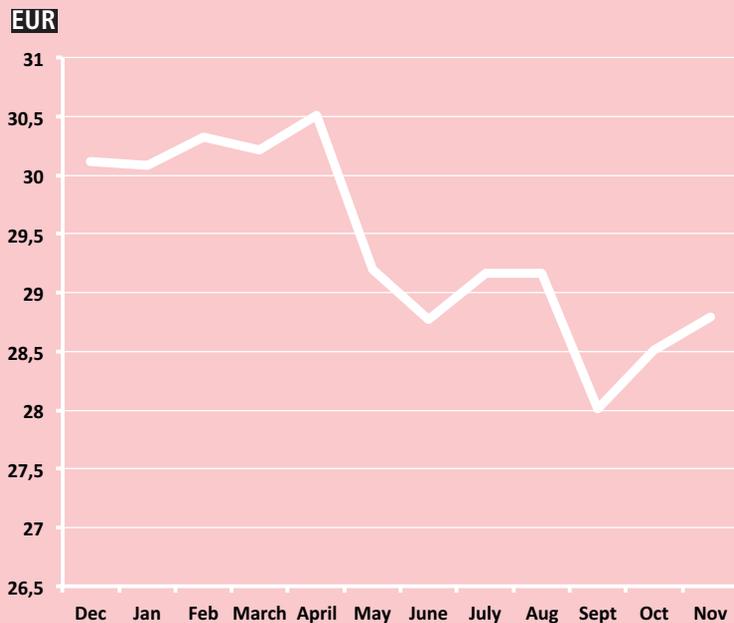
To stay below 2°C, the target for aviation for 2030 should not exceed

39 percent of its 2005 emission levels (50 percent below the baseline) and should be -41 percent compared to its 2005 emission levels in 2050. The respective targets for shipping are -13 percent and -63 percent compared to its 2005 emissions in 2030 and 2050, respectively. If non-CO₂ impacts are taken into account, these targets would need to be even more stringent. Taking into account the estimated mitigation potential within the sectors, it is unlikely that targets which are compatible with the below 2°C objective can be achieved only with technological and operational improvements within the sectors. Thus, these potential targets indicate the extent to which both sectors could contribute adequately to global GHG mitigation efforts.

Achieving these targets may require both encouraging behavioural change, which leads to reduced demand for international transport services and enabling the offsetting of climate impacts by financing emission reductions in other sectors. Moreover, it needs to be taken into account that particularly the non-CO₂ climate impacts of aviation will not be reduced if fossil fuels are replaced by hydrocarbons extracted from renewable energies. Only electrical propulsion, demand reduction or offsetting remaining emission will enable full decarbonisation of the aviation sector.

Text: Alan Sherrard
B183/5125/AS

Editor's note: The report can be found on <http://www.europarl>.

PELLETS EUR/MWh • December 2014 - November 2015**Pix Pellet Nordic CIF**

The industrial pellet market in Europe is still affected by the Drax unit 2 downtime and by exchange rate pressures, as reported by Hawkins Wright's Forest Energy Monitor. US pellet producers have been reluctant to lower their prices, regardless of the weakened EUR exchange rate against the US dollar, giving European producers an advantage in pricing.

Spot trade for both imported and intra-EU pellets has been sluggish, impacted also by the fall of stocks of industrial ARA pellets by 6.7% in September. An oversupply in industrial pellets continues, and the awaited seasonal upturn in pellet trade has not yet been seen. The latest statistics show that there has been some growth in wood pellet imports in January-August 2015 to the EU area compared to same period last year, the three largest exporters being USA (almost 60%), Canada (over 20%) and Russia (over 10% of the total imports).

According to the AEBIOM Statistical Report 2015, the use of industrial wood pellets has decreased 1.6% from previous year in the EU area in 2014. The drop derives mainly from a reduced Belgian and

Dutch pellet usage, while the pellet use in Denmark and the UK has increased. This shows the industrial pellet sector's significant leaning on national support policies. In 2014, the share of the UK in the European industrial pellet consumption was about 60%, while Denmark covered about 20%.

The heating season has started in the Nordics, and temperatures were quite near the long-term average in October, while at least some areas had much more sunshine than on average. Changes in price quotes reported to us for the PIX Pellet Nordic Index were again mixed with a small upward majority. The EUR value fell against the SEK in October by 0.5%, compared to the September 2015 average.

This meant some upward pressure to the EUR-value and the opposite to the SEK-value. After removing the highest and lowest 10% of the price quotes, the PIX Pellet Nordic index value increased in EUR-terms by 28 cents, or by 0.98%, ending at 28.79 EUR/MWh. The value increased also in SEK, by SEK 1.37, or by 0.51%, and closed at 269.14 SEK/MWh.

B183/5124/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. 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.

Biomass Thermal Energy Council Update**National Bioenergy Day**

As part of National Bioenergy Day, BTEC along with its colleagues in the biomass industry helped plan a panel discussion in Washington, D.C. that served as the kickoff event of the newly re-chartered House Biomass Caucus of the US Congress.

The event drew an audience of over 50 policy and industry representatives, and the turnout reflected the increasing support and interest in biomass as an important national source of sustainable energy. The groups represented on the panel were the US Forest Service, the Environmental and Energy Study Institute, Wilson Engineering Services speaking for thermal and CHP technologies, the Biomass Power Association, and Enviva Biomass. The panelists shared their updates on biomass projects that they are engaged in, as well as the overall benefits of biomass energy to national, regional, and local economic and environmental markets.

With over 60 organizations participating in the 3rd annual National Bioenergy Day this year, BTEC is encouraged by the success of this national event and is confident that the efforts of non-profits, industry, and government organizations will continue to increase support of this sustainable energy source.

Biomass Thermal DC

On November 18, BTEC was proud to host the Biomass Thermal DC Summit 2015 on Capitol Hill. This event served as a fly-in and brought together members of the biomass industry including university professors, pellet and boiler manufacturers, federal employees, and other biomass related non-profit groups.

Summit attendees had the opportunity to meet with more than 40 Congressional members, staffers, and federal agencies to discuss the enactment of policies and programs that will promote the widespread use of sustainable biomass feedstocks. The main topics discussed were the 2015 Biomass Thermal Utilization Act, tax incentives for biomass, and how biomass is defined in legislation and regulatory language as a renewable and



clean thermal energy source. Attendees experienced first-hand the importance of personally reaching out to their Representatives and Senators, and many stated that they were encouraged by the successful conversations they had to continue communications and attend fly-ins in the future.

Statewide Wood Energy Teams (SWETs)

With environmental issues such as climate change, invasive species, and intense wildfires threatening forests of the Western US, these states have collaborated to form their own SWETs and gathered in The Dalles, OR in October at the 2nd annual Wood to Energy meeting. This event catalyzed broad support for a regional vision to protect and utilize future woody biomass in the Western US, and allowed each state's SWET to learn from each other and outside experts on issues that they face such as economic and political support and how to sustainably grow the biomass economy.

The conference highlighted the power that lies within biomass stakeholders themselves when working together on a state and regional level to identify, strategize, and achieve common goals. States in the Northeast and Midwest have been developing SWETs over the last few years and have already begun to collaborate on efforts to promote the biomass heating industry. As different regions of the US face very dissimilar levels of biomass utilization and differing feedstocks and levels of state support, the development of regional support networks such as this is key for the identification of the common elements needed by the US biomass thermal market to turn a diverse industry into a major market.

*Meghan Martin, BTEC,
Clean Energy Fellow
B183/5119/AS*

Biomethane overlooked in biofuel quota design

Biomethane can help Europe to significantly cut air pollution and carbon dioxide (CO₂) emissions from the transportation sector. Upgrading technology and legislative challenges reflecting this potential were recently discussed at a conference in Berlin, Germany.

ACCORDING TO FIGURES in the “EBA Biogas Report 2014” published by the European Biogas Association (EBA) the biomethane industry followed the growing trend of biogas, reaching 282 plants across Europe with a total annual production of 1 303 billion m³ in 2013. Furthermore the number of biomethane filling stations doubled in 2013 increasing the share of biomethane used in transport to 10 percent of the total produced biomethane in Europe. More recent figures revealed during the conference suggest that there are now over 340 biomethane facilities in 17 countries across Europe.

Held at the end of September the “Biomethane as a Fuel” conference, which took place at the Austrian Embassy, was organized by Evonik Fibres GmbH and German Energy Agency, DENA. The former is an Austria-based subsidiary of German speciality chemical major Evonik Industries GmbH and the only plant within the group specialised in the production of polyimide fibers used for seals, insulation and hot-gas filtration including biogas upgrading to biomethane.

Legislative obstacles

Norbert Barthle, MP of the Bundestag, Parliamentary State Secretary at the Federal Ministry of Transport and Digital Infrastructure said in his keynote speech that also the long-term growth prospects of transport in Germany depend on global ability to incorporate energy-efficient as well as climate- and environmentally friendly solutions.

– Alternative fuels offer promising results and, in addition to technological innovations and the emissions trading scheme, are able to contribute to decouple transport performance and emissions in the future, Barthle stated.

Dr Max Peiffer, from law firm Assmann Peiffer talked about legal obstacles when using biomethane as fuel and practical experiences in

this area. Dr Peiffer has carried out numerous legal assessments on energy projects for the purpose of optimizing the economic efficiency and clarifying the eligibility of renewable energy remuneration. He is also a specialist on technical plant-related disputes for state courts and arbitral tribunals.

According to Peiffer, grid-based energy supply is especially subject to an intensive regulatory framework, thus a solid legal knowledge is essential for the implementation of new ideas in this field. Also on the stages of energy production and consumption only players familiar with the relevant legal framework will be economically successful.

– The legal situation is very complex today. No other area of law is as interdisciplinary as energy law. It comprises inter alia European law, German constitutional law, administrative and civil law, Peiffer explained.

The legislator, he said, did not think of biomethane when designing the regulations for biofuel quota. As a consequence it is hard to “fit” biomethane into the existing regulation. If biogas is produced from any other material than organic waste, liquid or dry manure, the law does not give any standard value. In absence of a standard value the emissions need to be assessed by way of export reports. That makes the GHG-calculation very expensive.

– In fact a stronger support of biomethane is needed in order to make use of this unique kind of energy in the fuel sector, said Peiffer.

Blend with LNG?

Harm Grobrügge, Vice-President, EBA, concentrated his outlook on what should be done regarding EU-goals and legislation on biomethane. Grobrügge operates his family’s farm in Northern Germany with an on-farm biogas plant installed in 1983. He has been active in the German Biogas Association (Fachverband Biogas) since 1985 at

various positions.

According Grobrügge, it is possible to decrease further the greenhouse gas emissions of gas by blending natural gas with biomethane. The new German Energy Agency study “LNG in Germany: Liquefied Natural Gas and Renewable Methane in Heavy-Duty Road Transport, 2014”, shows that LNG at a 4 percent market share could reduce the GHG emissions of road-freight transport in Germany by 240 000 tonnes CO₂ per annum, if a 20 percent blend of biomethane is used.

– Therefore, because of natural gas’ capacity to reduce emissions, particularly when blended with renewable methane, the political emphasis of decarbonising the energy sector should be on phasing out other fossil fuels first, said Grobrügge.

Lack of infrastructure

Biomethane is continuously increasing its share on the EU methane market and estimated to reach 10 percent share by 2030.

– Since renewable and fossil gases benefit from the same infrastructure, the investments on gas infrastructure do not lead to stranded assets, said Grobrügge.

The low use rate is, in most countries, connected with the lack of infrastructure.

– For example in Germany there are more or less no filling stations for LNG in road transport. LNG is mainly considered for the maritime sector, but has barely been discussed on the political level so far. There are no incentives foreseen to attract first investments. Knowledge exchange seems to be missing, underlined Grobrügge.

Grobrügge referred to several examples. In Sweden, the first filling station for liquefied methane was opened in 2010 and in the same year the first truck powered by liquefied methane was deployed. Currently, there are around 70 trucks that run on liquefied methane and six filling stations for liquefied methane are in operation. In



Norbert Barthle, MP, Parliamentary State Secretary, Federal Ministry of Transport and Digital Infrastructure.



Describing in detail the legal complexity for biomethane, Dr Max Peiffer, with Assmann Peiffer law firm.



– Liquefied biomethane might be an interesting option for inland waterways, noted Harm Grobrügge, EBA.

Norway a few towns including the capital Oslo are deploying public transport with busses fuelled by liquefied biomethane.

– In the future, liquefied biomethane might be an interesting option for inland waterways, like the Rhine and the Danube. One of the benefits of gaseous fuels is the intermodality: waterborne and road transport complement each other, remarked Harm Grobrügge.

Text & photos: Markku Björkman
B183/5086/AS

AGRAFERM COMPLETE 20TH UK PLANT AND SET-UP IN KOREA

2015 marks a decade of growth for German turnkey biogas solution providers Agraferm Technologies AG. It also marks the 20th installation in the UK and the setting up of a subsidiary, aptly called "af biogas", in the "Land of Morning Calm", South Korea.

FOR BAVARIA-BASED Agraferm Technologies, 2015 marks a decade of business. Founded in 2004 as part of the Agraferm Group, it commissioned its first biogas plant in the UK in October 2011. This was the 1.4 MWe Taverham biogas power plant in Norfolk for Guildford-based Future Biogas Ltd, which was also the first plant for Future Biogas.

UK biogas future

– The UK is one of the most promising future markets for us. With Future Biogas we have found a competent and reliable partner, who understands the flexibility, reliability and associated economic benefits the Agraferm Technology offers, commented Markus Ott, Sales Director at Agraferm Technologies AG. Since then Agraferm is on track to have completed 20 biogas projects in the UK by the end of

2015, which combined have the capacity to provide around 200 million Nm³ raw biogas per annum. This includes the first ever agricultural-based biomethane-to-grid project, the 5 MW Poundbury plant for the Duchery of Cornwall commissioned in 2012. Several projects are for Future Biogas including the 2 MWe Oak Grove plant as well as a flexible substrate gas-to-grid project in Methwold currently under construction. This plant will produce biomethane at a rate of 400 Nm³/h as well as power the 500 kW CHP plant.

– We appreciate that Agraferm has been a strong, punctual and reliable partner and the performance of our existing plants has encouraged us to work with Agraferm technology again. The timetable for this project is demanding, but we are convinced that the cooperation will enable us to cope with this challenge, said Philipp Lukas, Managing Director of Future Biogas and board member of the Anaerobic Digestion and Bioreources Association (ADBA).

Korea next

In mid-November Agraferm Group announced plans to expand into the Asian markets by setting up "af biogas", a biogas



Getting "af biogas" to a start with a Korean delegation in Zell am See, Austria together with Agraferm sales team, Matthias Kellerer (1st from left) and Markus Ott (4th from left). A Memorandum of Understanding (MOU) has been signed with the government of Jeollabuk-do province in Korea.

technology subsidiary in Seoul, South Korea. According to the company its biogas technology is ideally suited to the environmentally sound disposal of waste and recovery of energy from waste material from the intensive agriculture and animal husbandry practised in the region. Furthermore the Group has already experience of projects with the bio-mechanical treatment and utilization of other organic waste via its subsidiary BTA International GmbH.

– We are planning to build the

first plant next year and two more plants are to be added in 2017. The plants are going to be started up initially with in-house operation so that we can train the personnel adequately and guarantee reliable transfer of our efficient project management and technology knowledge, explained Dr Kyong-Hee Choi, Korean representative for af biogas.

*Text: Alan Sherrard
Photo: Agraferm
B183/5043/AS*



FUTURE BIOGAS INAUGURATE FIRST TRIOGEN ORC IN THE UK

Photo: Raymond Taylor

Future Biogas and Triogen have opened the first UK installation of a Triogen ORC power unit at the Oak Grove Renewables biogas site in Norfolk. The event was officiated by the deputy Dutch ambassador to the UK, Margriet Leemhuis.

ORIGINALLY COMMISSIONED IN 2013 by Future Biogas Ltd, the Oak Grove Renewables site is a 2 MWe biogas power plant in Scottow, Norfolk. Future Biogas was set up in 2009 up to develop, construct and operate biogas plants across the UK. Supplied by German turnkey biogas technology providers, Agrafarm Technologies AG, the Oak Grove plant utilises around 35 000 tonnes per annum of maize and grass silage. This is sourced from Aylsham Growers Renewables Ltd (AGRL), a group of local farmers all within a 12 km radius of the plant. The digestate is put through a press screw from German FAN Separator GmbH before used as a bio-fertiliser.

Residual heat to power

Future Biogas has currently eight biogas plants including a biogas-to-grid facility in operation and has another two projects under construction. The plants use a

range of biomass feedstock sourced in partnership with local farmers.

– We see that more can be done to optimize performance of the biogas plants, commented Philipp Lukas, CEO of Future Biogas and Board Member of the Anaerobic Digestion & Bioresources Association (ADBA).

Lukas was referring to utilizing the residual heat from the gas-fired engine, a challenge considering the rural location of the plant with no obvious heat sink such as space heating in the vicinity. Applying the high-temperature organic rankine cycle (ORC) technology from Dutch providers Triogen, the residual heat from the engine is converted into electricity. The plant is expected to increase its electrical output by up to 10 percent without any additional input material.

– We are pleased to work with Triogen as they offer a mature solution with long track record and very high efficiency levels. This allows us to build an attractive business case while reducing the overall cost of generating power from this site, said a notably pleased Lukas.

The celebratory event also featured a discussion by industry experts on “the future of efficiency and cost reduction in AD”.

– Bioenergy based energy generation is an important contributor



A showcase of successful Anglo-Dutch business cooperation as symbolically demonstrated by Margriet Leemhuis (centre) deputy Dutch Ambassador to the UK together Philipp Lukas, CEO, Future Biogas (left) and Henning von Barsewisch, CEO, Triogen during the ribbon cutting ceremony. With the market entry in the UK, Triogen is now active in eleven countries across Europe.

to achieving the UK’s emissions targets. Government and industry need to work together to reduce the cost of bioenergy based energy generation. I believe that significant cost reductions are possible and turning heat into electricity, as demonstrated by Oak Grove and Triogen, is an important piece to this puzzle. We encourage the government to continue the dialogue with this industry to realize its potential, said Charlotte Morton, CEO of ADBA in her address.

– Our technology is a contribu-

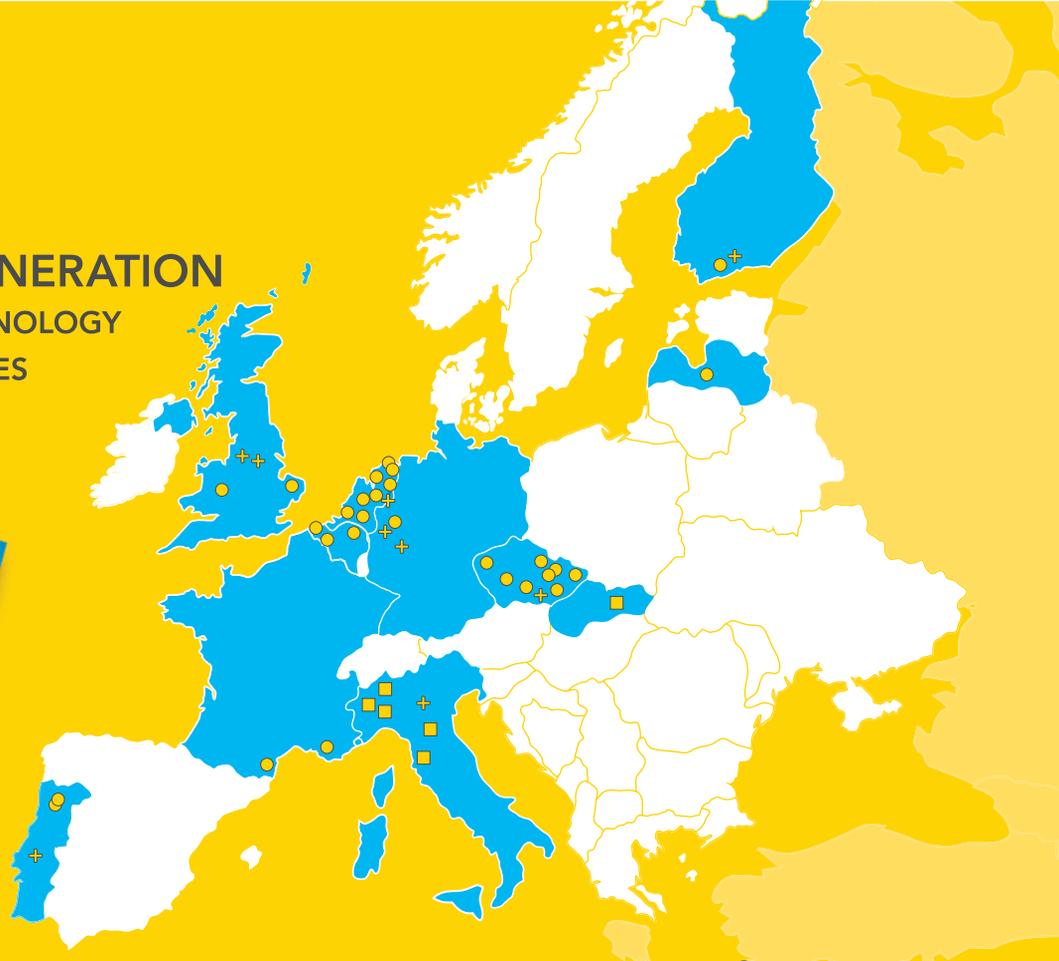
tion to making decentralized generation more affordable which will be an important factor for reaching the politically agreed emission targets. Converting the excess heat available from a biogas plant into electricity reduces the cost of producing power from the plant by 5 percent. Thus, we offer a key technology to making biogas more cost effective, said Henning von Barsewisch, CEO, Triogen.

Text & photo: Alan Sherrard
B183/5081/AS



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Biogas Suppliers Directory 2015

The 2015 directory includes 116 internationally active companies within the biogas sector. The purpose is to provide an overview and the table gives a general presentation of companies and activities. It includes turnkey providers of biogas plants as well those that supply ancillary components and equipment needed for biogas and/or biomethane production. To qualify companies have to be engaged in export and/or have subsidiaries in other regions, the country shown is where it is headquartered. Although comprehensive the listing is not exhaustive neither is it an endorsement.

Company	Comments	Country	Website
2G Energy AG	Suppliers of cogeneration systems, offers systems with an electrical capacity between 20 kW and 2 000 kW for operation with natural gas, biogas or hydrogen	Germany	www.2-g.com
4R Group	Innovators in waste science and recycling technologies providing a low risk and cost effective recycling service.	UK	www.4r-group.co.uk
A-Consult	Designes, manufactures and installes precast concrete anaerobic digesters and storage tanks	UK	www.aconsult.co.uk
Aardvark EM	Provides services for feasibility, planning, permitting, technical and financial due diligence for farmland waste-based projects	UK	www.aardvarkem.co.uk
AB Energy SpA	Represents cogeneration industry with technologies and solutions able to ensure more energy management, which cut consumptions and waste to the benefit of company competitiveness and the environment.	Italy	www.gruppoab.it
AcrEnergy	Develops, builds, operates and maintains biogas plants that make use of organic agricultural waste including live-stock manure, fruits and vegetable waste as well as energy crops to generate biogas	UK	www.acrenergy.com
Aero Thermal Group	Group of companies experience in providing solutions for the aerospace, motorsports and process engineering industries with waste autoclave and thermal hydrolysis	UK	www.aerothermalgroup.com
ADI Systems Inc	Offers different wastewater treatment technologies	Canada	www.adisystemsinc.com
Againity	Provides solution for converting waste heat into electric power in various applications	Sweden	www.againity.com
Agraferm Technologies AG	EPC contractor and technology provider for AD biogas and biomethane plants and waste treatment. The range of services also includes technical and biological service.	Germany	www.agraferm.com
Agrar Plus Beteiligungs-GmbH	Provides energy contracting, biomass district heating systems, cogeneration, and biogas	Austria	www.agrarplus.at
Agrico Engineering Sales Ltd	Manufactures the digestate treatment and handling equipment, feeding equipment, mixers, pumps and separation equipment.	UK	www.eisele.de
Agrikomp UK	Supplies anaerobic digester systems	UK	www.agrikomp.co.uk
Aikan A/S	Produces biogas for energy generation	Denmark	www.aikantechnology.com
Air Liquide Advanced Business and Technologies	Manufactures biogas cleaning and upgrading equipment, offers gas conversion technologies, gas pump/biomethane compression equipment.	France	www.airliquideadvancedbusiness.com
Alfa Laval Nordic	Manufacturers of dewatering equipment, heat exchangers, and membrane and separation equipment	Sweden	www.alfalaval.com
Alvan Blanch	Develops digestate treatment and handling equipment, feeding equipment, heat exchanger.	UK	www.alvanblanchgroup.com
Ambient Energy LLC	Develops M3RP (Machine - Reuse, Recover, Recycle Process), which is a robust machine that can handle several different feedstocks. The technology is a conversion/transformation system that is known as pyrolysis and depolymerisation, which processes carbon-based feedstocks (such as roofing shingles) in an oxygen-free environment.	USA	www.ambientnrg.com
Amitec Oy	Offers technology, process and material handling solutions	Finland	www.amitec.fi
Aprovis Energy Systems GmbH	Offers project planning and sales, design, electrical engineering, order processing and service and supplies products to all major engine manufacturers	Germany	www.aprovis-gmbh.de
Aritor	Manufactures pre-treatment feedstock technology and separation equipment	UK	www.turboseparator.co.uk
Asia Biogas Co. Ltd.	Designs, constructs, finances and operates clean energy projects, centred on anaerobic digestion and biogas production.	Thailand	www.asiabiogas.com
Awite Bioenergie GmbH	Develops, manufactures, sells and maintains individually designed process analysis systems for various types of biological reprocessing plants.	Germany	www.awite.com
Balmoral Tanks	Supplies the anaerobic digester systems, digestate treatment and handling equipment, gas storage equipment, tanks	UK	www.balmoral-group.com
BDI - BioEnergy International AG	The company is suitable for the bioenergetic recovery of difficult industrial and municipal residual and waste products	Austria	www.bdi-bioenergy.com
Binowa GmbH	Supplies anaerobic digester systems, offers biological optimisation, instrumentation, monitoring and control	Germany	www.binowa.de
Biogest Biogas	Manufactures biogas plants using Biogest PowerRing technology.	Austria	www.biogest-biogas.com
Biotec Sistemi S.r.l	Offers equipment for anaerobic digestion. Supplies turnkey plants e.g. for the treatment of Municipal Solid Waste (MSW), Source Separated Organic Waste (SSOW), and more	Italy	www.biotecsystemi.it
Biothane Systems International	Company having focus on highly efficient, cost-effective biological methods to treat wastewater while creating energy and reducing pollution.	Netherlands	www.biothane.com
Bruker Optics Ltd	Offers comprehensive support in every discipline including information and communication, consumables and spares, support and upgrades, as well as education and training	UK	www.bruker.com
BTA International GmbH	Specialist for the wet mechanical pre-treatment of different kinds of waste and the subsequent anaerobic digestion of the organic fraction according to the BTA® Process for the production of biogas.	Germany	www.bta-international.de
BTS Biogas Srl/GmbH	Provider of turnkey biogas power plants	Italy	www.bts-biogas.com
Cambi AS	Provides advanced waste and sludge biogas systems, focused on maximising energy production and minimising final product mass	Norway	www.cambi.no
CBS Concrete Products	Manufactures precast concrete wall solutions, tanks and silage clamp	Belgium	www.cbs-concreteproducts.co.uk
CCI Bioenergy	Provide equipment and technology to convert MSW to energy, using anaerobic digestion	Canada	www.cci.bioenergy.com
Cellwood Machinery	Develops, manufactures and supplies machinery and systems for pretreatment of organic waste by superior dissolving and reject separation	Sweden	www.cellwood.se
Chinese Academy of Agricultural Mechanization Sciences	Provides straw balers, cotton stalk harvesters, straw cutting-rubbing equipments, biomass gasification technology and equipments, and the resource utilization technology of the farm & livestock wastes.	China	www.caams.org.cn
Clearfleau	Supplies anaerobic digester systems	UK	www.clearfleau.com
CTU- Concepte Technik Umwelt AG- Clean Technology Universe	Dynamic enterprise with vast experience in the fields of thermal waste treatment, waste gas cleaning and energy production from biomass	Switzerland	www.ctu.ch
DMT Environmental Technology	Market leader in the field of biogas upgrading, for which company applies advanced membrane technology.	Netherlands	www.dmt-et.nl
Doppstadt	Manufactures feedstock pre-treatment technology and separation equipment	Germany	www.doppstadt.com

Company	Comments	Country	Website
Dorset Green Machines BVDorset Group BV	Manufactures the belt dryers and produces anything from plug-and-play container solutions up to complete organic fertiliser factories	Netherlands	www.dorset.nu
Dreyer and Bosse Kraftwerke GmbH	Manufactures biogas cleaning and upgrading equipment and CHP engines	Germany	www.dreyer-bosse.com
DSM Bio-based Products & Services B.V.	Experience in fermentation technology, optimally use the "reactor" to create maximum output. Actively working on major innovations in the biomass utilisation towards renewable fuel or bio-based chemistry.	Netherlands	www.dsmbiogas.com
Eggersmann Group	Supplies anaerobic digester systems, digestate treatment and handling, instrumentation, monitoring and control	Germany	www.f-e.de
ElectraTherm Inc	Provides small-scale waste heat recovery systems	USA	www.electratherm.com
Eneco	Manufactures and supplies plant components. Provides control and instrumentation systems, gas control systems, and connection to gas grid	Netherlands	www.energytradeuk.eneco.nl
Ennox Biogas Technology	Manufactures cleaning and upgrading equipment, digestate treatment and handling equipment, gas storage and heat exchangers	Austria	www.ennox.at
Enspar Biogas GmbH	Delivers complete biogas plants	Germany	www.enspar.de/en
Entec Biogas GmbH	Manufactures anaerobic digester system, biogas cleaning and upgrading equipment, digestate treatment and handling. Offers engineering and process consultancy	Austria	www.entec-biopower.at
EnviTec Biogas AG	Provides systems for production of biogas - including the planning and turnkey construction of biogas plants as well as their commissioning	Germany	www.envitec-biogas.de
ETW Energietechnik GmbH	Supplies solution for combine heat and power (CHP) and biomethane plants	Germany	www.etw-energie.de
Eurotec WTT	Planners and manufactures of biogas plants, plants components and consulting	Italy	www.eurotecwtt.it
Evonik Fibres GmbH	Manufactures and supplies plant components: gas cleaning gas processing, gas upgrading and separation systems	Austria	www.evonik.com
Exergyn	Manufactures CHP engine, ORC systems	Ireland	www.exergyn.com
Extech GmbH	Provides biomass gasifiers and biogas plant components	Germany	www.extech-de.com
Farmatic Anlagenbau GmbH	Provides an alternative to conventional waste disposal for agricultural organisations, as well as industry and local authorities	Germany	www.farmatic.com
Feniks Pro d.o.o	Creates a uniform system to monitor and manage facilities from one place	Slovenia	www.feniks-pro.com
Flexenclosure AB	Designs and manufactures a prefabricated modular data centres and intelligent power management solutions.	Sweden	www.flexenclosure.com
Fraunhofer UMSICHT	Supplies biogas cleaning and upgrading equipment, pre-treatment of feedstock technology	Germany	www.umsicht-suro.fraunhofer.de
GE Energy Jenbacher gas engines	Manufacturers of gas-fuelled reciprocating engines, packaged generator sets and cogeneration units for power generation	Austria	www.gejenbacher.com
GM Green Methane Srl	Manufactures biogas cleaning and upgrading equipment	Italy	www.gm-greenmethane.it
GreenWatt S.A.	Designs and installs on-site biomethanisation plants fully adapted to farming and agribusiness needs.	Belgium	www.greenwatt.be
Hennlich s.r.o.	Offers energy chains applications, plant dedusting solutions and more	Czech Republic	www.hennlich.cz
Honeywell International Inc.	Power generation experience, delivers control systems and services to power generation facilities	Finland	www.honeywell.com
Host Bio-Energy Installations	Supplies bioenergy systems; delivers complete systems, from anaerobic digesters, wood-fired boilers and CHP plants to fluidised-bed gasifiers	Netherlands	www.host.nl
HRS Heat Exchangers Ltd	Manufactures dewatering equipment, heat exchanger, offers engineering consultants	UK	www.hrs-heatexchangers.com
IES Biogas s.r.l	Plannes and manufactures of biogas plants. Offers full-system supply and turnkey plans	Italy	www.iesbiogas.it
Jones Celtic Bioenergy	Supplies anaerobic digester systems, biogas cleaning and upgrading equipment.	Ireland	www.joneseng.com
Kinetic Biofuels A/S	Offers a new patented (patent pending) 2nd Generation technology using mainly straw briquettes as raw material enabling biogas producers to more than doubling the biogas production in existing and new biogas plants. Total briquetting lines from 1,5 to 10 tons per hour can be delivered	Denmark	www.kineticbiofuel.com
Kirk Environmental Ltd	Supplies anaerobic digester systems and tanks	UK	www.kirk-environmental.com
KIS Group	Offers sustainable green technologies for developing biogas and biomass projects	India	www.kisgroup.net
LJM Lind Jensens Maskinfabrik A/S	Manufactures mixer/stirrer for biogas plants for handling slurry and fluids	Danmark	www.ljm.dk
Lukeneder GmbH	Manufactures biogas cleaning and upgrading equipment, offers biological optimisation, technology for feedstock	Germany	www.lukeneder.de
Lundsby Bioenergi A/S	Delivers complete biogas plants	Denmark	www.lundsby.dk
Läckeby Water Group	Equipment for biogas production	Sweden	www.lackebywater.se
Malmberg Gruppen AB	Environmental technology company in the field of biogas, geoenergy, water treatment and drilling	Sweden	www.malmberg.se

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Abattoir Waste



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www.weltec-biopower.com

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Organic energy worldwide

Company	Comments	Country	Website
Mavitec Green Energy	Manufactures odour control equipment, separation equipment and more	Netherlands	www.mavitec.com
Megtec Systems Inc.	Global design, engineering, and manufacturing company providing industrial products and services to a diverse customer base serving a wide variety of market sectors.	USA	www.megtec.com
MT-Energie Biogas Technologie	Planned and manufactures biogas plants, arranging permitting, construction and commissioning support, full-system suppliers of turnkey plants	Germany	www.mt-energie.com
MTL Eaton Corporation plc	Offers accurate measurement and optimised production using user-friendly modular gas analyser for the biogas market	UK	www.eaton.com
Netzsch Pumpen & Systeme GmbH	Manufactures pumps for different industries	Germany	www.netzsch-pumpen.de
New eco-tec Verfahrenstechnik	Manufactures dewatering equipment, offers digestate treatment and handling equipment	Germany	www.new-eco-tec.com
Paques BV	Supplies anaerobic digester system, biogas cleaning and upgrading equipment, liquor treatment	Netherlands	www.paques.nl
Parker Hannifin Manufacturing Germany GmbH&Co.KG	Develops, manufactures, applies and sales innovative technical solutions in air and gas filtration, drying, separation, cooling and purification sectors	Germany	www.parker.com/hzd
Pentair process Technologies	Manufactures biogas cleaning and upgrading equipment, membranes, valve and separation equipment	Netherlands	www.pentair.com
PlanET Biogas Solutions, Inc	Specialises in the design, construction, and service of advanced biogas plants	Canada	www.planet-biogas.ca
PlanET Biogastechnik GmbH	Offers core competence in the construction of biogas plants, control techniques, and the construction of solid supply insertions. International presence	Germany	www.planet-biogas.com
Ramboll Group A/S	Offers energy consultants, engineering consultants, environmental consultants, process consultants, project management consultants	Denmark	www.ramboll.dk
Renecon Energy	Offers energy consultants and trainings	Nigeria	www.reneconenergy.com
Revis Bioenergy GmbH	Offers crop operations, farm waste operations, planning consultants	Germany	www.revis-bioenergy.de
RWL Water Italia	Supplies anaerobic digester systems, heat exchangers, instrumentation, monitoring and control, mixer/stirrer and pipes	Italy	www.rwlwater.com
Scandinavian Biogas Fuels AB	Designs and operates biogas plants	Sweden	www.scandinavianbiogas.se
Schaumann BioEnergy GmbH	Manufactures and delivers turnkey biogas plants	Austria	www.schaumann-bioenergy.eu
Schmack Biogas AG (Viessmann Group)	Plans and constructs biogas plants optimised for the fermentation of renewable materials	Germany	www.schmack-biogas.com
Schnell Zündstrahlmotoren AG & Co. KG	Manufactures CHP engines	Germany	www.schnellmotor.com
Serge Ferrari	Supplies plant components	France	www.sergeferrari.com
SEVA Energie AG	Supplies co-generation units in power range between 75 and 2 000 kW electrical output	Germany	www.seva.de
Stream BioEnergy	Develops the crops, farm waste, food waste	Ireland	www.streambioenergy.ie
Streisal GmbH	Develops, manufactures and globally markets innovative agitators and mixing systems for biogas plants, wastewater technology and industrial applications	Germany	www.streisal.de
Three Es S.r.l.	Provides technology for the pretreatment of every kind of biomass for biogas plants	Italy	www.biospr.it
Thöni Industriebetriebe GmbH	Manufacturer and supplier of AD plants for the anaerobic treatment of organic waste and agricultural by-products	Austria	www.thoeni.com
Tianjin HI-Tech Enterprise co., Ltd	Designs and manufactures the technology for biogas plants	China	www.tj-hitech.com/
TNO Energy	Works on the entire biogas value chain from biogas production, upgrading, transport, distribution and valorization	Netherlands	www.tno.nl
Triogen	Manufactures CHP engines, ORC systems, offers energy consultants	Netherlands	www.triogen.nl
University of Rostock Institute for Biogas, Waste Management and Energy	Conducts scientific analyses, provides expert advice, undertakes development work, compiles appraisal reports on technical and economic concepts, as well as engaging in knowledge transfer	Germany	www.biogasundenergie.de
Valmet Corporation	Global developer and supplier of services and technologies for the pulp, paper and energy industries	Finland	www.valmet.com
Veolia Biothane	Biothane is the anaerobic treatment brand of Veolia Water Technologies and is one of the world's leading companies in the field of biological treatment of industrial wastewater	Netherlands	www.biothane.com
Vitkovice Machinery Group	Engineering group with a strong position in selected segments of machinery production.	Czech Republic	www.vitkovice.cz
Vogelsang Maschinenbau GmbH	Manufactures pumping, grinding and spreading technology for the municipal, industrial and agricultural markets around the world	Germany	www.vogelsang-gmbh.com
Wackerbauer Maschinenbau	Manufactures feeding equipment, offers pre-treatment of feedstock technology and separation equipment	Germany	www.wackerbauer.net
Weltec Biopower GmbH	Worldwide provider of turnkey biogas and biomethane plants made from stainless steel (waste to energy, wastewater water treatment plants and agricultural plants) with references in 25 countries	Germany	www.weltec-biopower.de
Wuhan Cubic Optoelectronics Co.,Ltd	Designs and manufactures infrared flue gas analyzer, infrared syngas analyzer, infrared biogas analyzer and automobile exhaust gas analyzer	China	www.gassensor.com.cn
Wärtsilä Corporation	Develops and supplies gas handling and liquefaction technology	Finland	www.wartsila.com
Xylem Water solutions AB	Supplies plant components: offers substrate preparation and processing, stirring and pump systems	Sweden	www.xylemwatersolutions.com
Xebec Adsorption inc	Designs and builds biogas upgrading plants for landfill gas, waste water treatment and anaerobic digester gas	Canada	www.xebecinc.com

UK biomethane could quadruple with new RHI budget

In the UK the Chancellor of the Exchequer, George Osborne, has unveiled plans in the Spending Review and Autumn Statement announcement to extend the Renewable Heat Initiative (RHI) with additional £1.15 billion funding for new projects until the end of the current Parliament.

– We welcome the government's commitment to delivering renewable heat. Indigenous green gas will continue to be a vital part of UK heating, and ultimately biogas alone has the po-

tential to deliver 30 percent of domestic gas demand. Making RHI funding available for new projects to 2020/21 will clearly help support our industry's ambition, said Charlotte Morton Chief Executive, Anaerobic Digestion and Biorenewables Association (ADBA) in a statement.

The industry remains concerned, however, by the risk of hiatus before significant additional resource is available within the allocated RHI budget from 2017-18. ADBA is calling for DECC to set out their plans as quickly as pos-

sible and for a strong allocation for biogas and biomethane within the RHI budget in order to provide certainty for developers and investors. Biomethane has quadrupled in scale over the last year alone, with over 40 gas-to-grid plants in operation. If a reasonable proportion of the RHI budget is allocated to AD, and the scheme structure is workable, then according to the ADBA there could be 180 biomethane plants in operation by 2021.

B183/5139/AS

FROM COLD WAR TO COLD STORE

A former military airbase in Suffolk, UK is the location of what has become one of the larger biogas power plants in the country. Originally commissioned in 2011 as a 500 kW combined heat and power plant, the AgriGen facility has since grown by a factor seven to 3.5 MW electrical output.

BENTWATERS PARKS, IN SUFFOLK, about 150 km northeast of London was a former Royal Air Force (RAF) airfield during World War II that subsequently became a US Air Force base during the Cold War. Heralding a new era, the privately held 404 ha (1 000 acre) airfield with ancillary buildings was retired from military service some 20 years ago and repurposed into a commercial enterprise park.

Reduce energy costs

Founded in 2004 Suffolk Produce Ltd (SPL) is a co-owned farmers cooperative producer organisation (PO) based at Bentwaters Parks. Through SPL eleven farms representing over 13 300 ha (33 000 acres) in and around the airfield manage and market crops, primarily onions and tuber vegetables such as potatoes, parsnips and swedes. SPL have converted a number of aircraft hangers into vegetable processing, packaging and cold storage facilities.

For SPL the cost of energy is a key competitive concern and as a producer organisation (PO) SPL can invest in capital projects. Furthermore being a EU recognised PO, SPL is able to access applicable matched EU grant funding. In 2009 SPL formed a subsidiary AgriGen Ltd to setup a biogas plant at Bentwaters Parks that could use agricultural feedstock grown or sourced from its members to supply space heating and electricity.

– Drying out our onions and keeping them cool in storage uses a lot of energy so that's why we set up AgriGen, said Graham Thorne, Manager for AgriGen.

Maximising power out

Rather than build a single large plant in one go, AgriGen opted to build and commission in stages. The Austrian company, Thöni Industriebetriebe GmbH was selected to build the multi-million pound biogas plant. Thöni is an industrial group that has a division specialised in environmental technologies including composting and anaerobic digestion (AD) of energy crops.

In 2011 "AgriGen I", a 500 kW plant consisting of a fermenter, a secondary digester and a MWM combined heat and power unit (CHP), was commissioned supplying a share of heat to a local heating network and power to the grid. In July 2012, "AgriGen II", was started adding another 2 MW capacity with two larger digesters. This was ready in early 2013. A decision was made to install a 3 MWe GE-Jenbacher biogas engine from Clarke Energy and in September AgriGen ordered two 125 kW GE Clean Cycle Organic Rankine Cycle (ORC) units.

– The electrical efficiency of our Jenbacher engine is market-leading. However, we also saw the potential for the utilisation of the waste heat to generate more electricity. We selected ORC technology to boost the plant's performance further and deliver one of the most electrically efficient biogas facilities in the UK, said Thorne.

Plant setup

Consisting mainly of maize and triticale silage the feedstock is stored in silage clamps that are compressed and covered to limit degradation that would otherwise result in energy loss and odour emissions. A wheel loader is used to transport feedstock from the silage clamps to the digester in-feed, which consists of a special container module with automated conveyor. A reception pit for liquid feedstock such as manure also doubles as a storage tank for captured surface and drainage water from the silage clamps. Here also other solid feedstock material is received and mixed with the liquid feedstock before pumping into the heated and insulated rein-

forced concrete digesters with gas storage unit on top. An external desulphurisation unit removes hydrogen sulphide (H₂S) from the biogas before it is used in the CHP units. A separator unit separates the final digestate into a solid and a liquid phase with the latter pumped to a storage tank. Both are used as agricultural fertiliser.



A paddle-mixer under installation inside a digester.

Proprietary paddle-mixers

A key component of the plant is a custom-built and patented Thöni paddle-mixer. Substrate homogenisation in the digesters is achieved by means of slow turning paddle-mixers and by fast turning propeller mixers. The mixers also help to prevent the formation of floating layers and sedimentation while creating optimum conditions for microbial decomposition allowing the methane to escape from the substrate. The paddle-mixer is especially suitable for efficient mixing of different feeds with relatively high dry matter content as high mixing power eliminates the need for diluting the fermenter contents with water or recirculates. This means that fewer liquids have to be pumped through the plant resulting in lower energy consumption and maintenance costs. »

Weltec break ground for projects in Australia and South Korea

Germany-based biogas technology specialist, Weltec Biopower have together with its project partner Aquatec Maxcon begun construction of what is described as one of Australia's most innovative biogas projects and the first to be built by a German biogas technology provider. The 1 MW plant is being built in Aurora a suburb of Melbourne, New South Wales (NSW) for Yarra Valley Water, one of Australia's largest water utilities and will be one of the first of its kind Down Under. The few biogas plants that are currently online in Australia mainly utilise sewage sludge and industrial wastewater.

Mixed feedstock

Two 3 573 m³ capacity stainless-steel digesters will be fed with 100 tonnes of organic waste per day over half of which will come from cafeterias and restaurants. The rest will comprise of fats and oils, brewery and dairy leftovers, fruit and vegetable waste and sludge that will be pumped from the adjacent wastewater treatment plant. After the digestion process, the substrate will be sanitised and then buffered in a 4 531 m³ stainless-steel tank.

A custom-tailored input process will be set up to ensure uninterrupted



supply of the biogas plant. At the delivery area, the feedstock will first be loaded into two 35 m³ solid hopper feeder. Some of the substrates, such as melon peels, will first be shredded and then further chopped up with other raw materials and mixed with recirculation fluid in the MULTIMix system. After this preliminary treatment, the mixture will be pumped into the largest of the five stainless-steel pre-storage tanks with a total volume of almost 700 m³. The process is fully automated except for the loading of the input systems. However the size design of the pre-storage tanks ensures that no loading and thus no manpower will be required at night or weekends.

Second plant in South Korea

Weltec has also announced that it has begun construction of a 450 kW biogas plant in Gyeonggi-do province about 80 km north of the capital Seoul. A 4 000 m³ stainless-steel digester will use 100 tonnes of pig manure and organic waste a day as feedstock. The biogas will be used for heat and power, with the latter fed to the grid. The heat will be used for heating the company buildings and for internal processes and the digestate will be stored in two 5 590 m³ stainless-steel storage units before use as high-grade fertiliser.

B183/5115/AS

First Dutch farm-scale gas-to-grid plant commissioned

At a dairy farm in Den Bommel, the Netherlands, the gas meter recently passed the first 10 000 m³ of biomethane injected into the grid. Since October 2015, the plant is producing biomethane out of 100 percent cattle manure with direct injection into the Dutch national gas grid. Designed and supplied by Dutch biogas technology providers HoSt, the plant consists of a Microferm digestion tank, a gas tight after-storage, a container with the biogas upgrading and control panel, and a skid on which the biogas treatment, manure heat exchanger and heat pump are mounted. The Microferm digestion unit has the capacity to treat 8 000 tonnes of cattle manure annually and is specifically designed to digest manure at farm-scale, without the addition of co-substrates. Unique to this project is the upgrading of the biogas into biomethane with direct grid injection. The plant is estimated to produce 180 000 – 200 000 m³ biomethane annually.

It is the first plant in the Netherlands where 100 percent manure is digested, upgraded to biomethane and injected into the grid on this small scale.

B183/5126/AS

Central control

» For over a decade, Thöni has been working with Siemens to provide electrical components, automation and control for its biogas plants with many successful projects in Germany, Austria, Italy and now the UK. The paddle-mixers are driven by 11 kW planetary gearboxes with Profibus-controlled frequency converters. Due to their regenerative capability, they use up to 50

percent less power, and their new cooling concept makes for reliable operation. The smaller propeller mixers use soft starters to avoid high-cost performance peaks and protect the mechanical components. Siemens also developed and supplied a range of in-situ monitoring and detection meters and sensors such as temperature and gas pressure. A special feature is the use of radar for contact-free substrate measurement to enable limit detection and overflow protection. The radar sensor technology has been process adapted to overcome the effect of foam when measuring the fill level in the digester.

– Siemens is a powerful partner for us, so we as a medium-sized company feel that we have the support we need. We met numerous times throughout the project in many coordination meetings to find the optimum solution for the engineering of interfaces and other components and ultimately found it, commented Urban Zell, Head of Electrical Engineering at Thöni.

The technology container houses the central pumping station as well as the electronic control system under one roof. The pumping station especially developed for this application transports liquids and substrates economically and efficiently from one point to another. The pumping

technology is so flexible in design that it supports all combinations of flow paths. This saves energy, time and costs, while permitting problem-free operation of the plant. The operator can centrally monitor all factors important for operation of the plant via the controller and visualization software developed by Siemens, and intervene at any time. These automation components from Siemens, which have been tested in many plants set up in cooperation with Thöni, enable precise plant operation, exact monitoring of each individual component from input until output, and easy control of the plant.

– Thöni and Siemens had built the original AgriGen I plant, which meant it was clear that they would also build the expansion. The challenge was the expansion during operation. The project execution time was also very short and had to take place without any problems. In the long term, the plan is to refine the biogas from the AD plant to use for drying the onions and invest in heat exchange systems to run the cooling systems required for the longer-term storage of onions, ended Graham Thorne.

Text: Alan Sherrard
Photos courtesy Thöni

B183/5045/AS

Facts: AgriGen I & II

Feedstock: Maize & triticale silage
CHP power plants: MWM 500 kW
GE Jenbacher 3 MW

ORC unit: 2 x GE Clean Cycle 125 kW

Storage pit/liquids: 1 x 100 m³ underground concrete vessel

Feed pit/liquids, solids: 200 m³

Feed hopper/solids: 2 x 117 m³ 1 x 60 m³

Digesters: 2 x 3.000 m³, 2 x 4.000 m³

Gas storage: Double membrane 4 x 1.500 m³

Paddle-mixers:

3 x digester 1

3 x digester 2

3 x digester 3

3 x secondary digester

Gas cleaning:

External biological scrubber

KREISLÄUFE SCHLIESSEN – CLOSING THE LOOPS



Speakers at 19th Austrian Biomass Day, (left) Robert Fischer, Swedish Bioenergy Association (Svebio) with Johann Seitinger, State Councillor and Josef Plank, President, Austrian Biomass Association (ABA).

Held at the end of October in Bruck/Mur, in the forest rich province of Styria, Austria, the 19th Austrian Biomass Day was aptly hosted at the 110-year old Technical Forestry High School. The two-day event also marked and celebrated the 20th anniversary of the Austrian Biomass Association (ABA). This gave ample opportunity to take stock of what has been achieved and what needs to be done.

THE AUSTRIAN BIOMASS ASSOCIATION (ABA) has a lot to celebrate. Hosting the event at a venue with a long tradition and well-established links to the bioenergy sectors in Austria in a province with 61 percent forest cover was aptly fitting. Founded on 20 April 1995 by the Austrian stalwart of bioenergy Dr Heinz Kopetz, who now presides over the Stockholm based World Bioenergy Association (WBA), ABA had set the goal for bioenergy in Austria to 203 PJ by 2010, which represented a 44 percent increase compared to 2005 levels.

Biomass - largest and fastest growing renewable

This has been achieved. Renewables and wastes in Austria account for about 26 percent of the country's energy end use. Bioenergy holds a share of over 60 percent of this, 216 PJ in 2013, and displays the biggest growth of all renewables. A 25 percent increase from that level until 2020 is the current goal and in 2030 bioenergy is expected to contribute to one third of end-energy use in Austria. ABA has also impacted the in-

ternational bioenergy scene with its successful central-European biomass conferences, the most recent of which, as reported in *Bioenergy International* no. 2/2014, was held in 2014 in Graz and attracted over 1100 delegates from over 45 countries.

Low climate ambitions

Although Austria is perceived by many as a champion of bioenergy, not least due the formidable international success of Austrian pellet and woodchip home heating appliances, Austrian climate targets show low ambition paired with a lack of political will to implement sufficient supportive measures. Austria has currently an emissions reduction target of for 16 percent for 2020 from 2005 levels. This is in fact only 4 percent reduction from 1990 levels and recent estimates show that Austria is amongst the

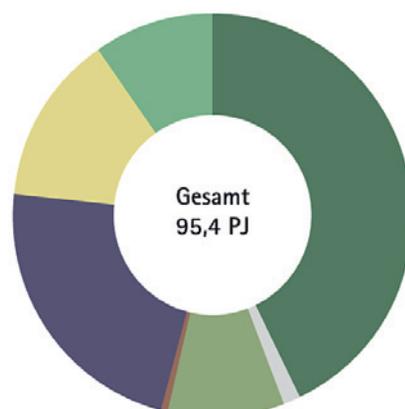
countries off track on achieving even this goal. Greenhouse gas (GHG) emissions have actually slightly increased over the 1990 levels and with 9.5t CO₂-emissions per capita (in 2012) Austria is above EU28-average.

Decoupling failure initiates action

Furthermore, at the time of writing, Austria is still lacking a climate goal for the period after 2020. So far the country has experienced a 2°C average temperature increase above pre-industrial levels compared to the global increase average of 0.85°C. A more tangible indicator are the number of so-called tropical days, days where temperatures rise above 30°C. Such days have more than quadrupled in some regions in Austria since the 1960s. Another important indicator is that Austria, unlike most OECD countries, did not manage to decouple energy consumption from BNP growth over the last decade.

The Austrian government has though implemented a number of measures. In 2012 the renewable energy law, *Ökostromgesetz (ÖSG)*, which provides investment subsidies paired with different Feed in Tariffs (FiTs) for different renewable technologies was updated. FiTs are guaranteed for a time period of 15 years for bioenergy and 13 years for other renewables. These FiTs vary around EUR 0.1/kWh and allow new technologies, such as micro-CHP to emerge. The aim of the ÖSG is to achieve the goal of 34 percent renewables in the national energy mix by 2020 (31 percent in 2010). The newly enacted Energy Efficiency Law (*EEffG, 2015*) shall contribute to the decoupling-efforts of Austrias energy consumption from economic growth. The EEffG has been heavily criticized from the bioenergy industry due to its lack of ambition, especially the exchange of older oil-heating systems to newer and more efficient oil-heaters is supported through this law until 2018, which is seen as a continuation of the status quo – more than 700 000 households in Austria still heat their homes with fossil oil. ABA along with the renewable energy sector is forming a coalition to advocate for more ambitious national goals on emissions reductions and for renewables, where the introduction of a CO₂-tax shall become the

Ausbaupotenzial Bioenergie von 2013 bis 2030



42,9 % ■ Holz-basiert Forstwirtschaft
1,4 % ■ Laugen
9,6 % ■ Holz-basiert Kurzumtrieb
0,2 % ■ Klärgas
22,7 % ■ Biogas
13,7 % ■ Biogene flüssig
9,4 % ■ Sonstige Biogene fest



A well attended Austrian biomass conference took stock on what has been achieved and what remains to be done.

cornerstone for the rebuild of the tax system, shifting tax load from labour to energy and pollution.

“Kreisläufe schließen”

“Kreisläufe schließen” or “closing the loops” was the theme of the conference framing a very diverse set of presentations. The first day covered frameworks and current climate and energy situation on national and international level whereas day two looked at district heating utilities. All three introductory speakers, led by Johann Seitinger, emphasized the current situation with the refugee-crisis affecting Europe likely to overshadow the most important climate event in Paris–COP21. The speakers agreed that the refugee-flow arriving in Europe as we see it now is only a foretaste for what Europe should be prepared for if a climate agreement cannot be achieved and the global temperature increases far beyond the target of 2°C.

Pushing for carbon tax

Framed by this gloomy outlook it was heartening to experience the spirit from the oncoming speakers how they have contributed to the successes of the bioenergy sector in Austria in the last 20 years and how they aim to achieve the ambitious goal of one third of Austria’s energy end-use by biomass in 2030. Josef Plank, President of ABA, presented the association’s “Bioenergy 2030” vision highlighting that it is high time that the nation’s climate ambitions are

raised. Furthermore the ABA in coalition with partners from other industrial sectors are proposing that the implementation of such ambitions are supported through the introduction of a carbon tax as part of a package of supportive measures.

Robert Fischer from the Swedish Bioenergy Association, Svebio, was the first of two speakers invited from abroad to contribute with their country’s experiences to the conference. Fischer emphasized how the CO₂ tax as introduced in 1991 targeting the non-ETS-sectors has contributed to a rapid decarbonisation especially of the Swedish heating sectors and how the green electricity certificate as introduced in 2003 encouraged investments in biobased-CHP in district heating and industry. Sweden has successfully reduced CO₂ emissions by 30 percent from 1970-levels to 1990 and another 25 percent from 1990 levels to 2014. In fact oil based heating in homes has dropped from over 90 percent in the 1970s to about 1 percent today. The renewable energy share of energy end-use is above 50 percent since 2011 and biomass contributes 34 percent or around 130 TWh to Sweden’s energy end-use. The full carbon tax of EUR 121/tonne CO₂ is applicable to all sectors from 2018, when finally the last exceptions to heavy industry are expiring.

Fine removal and ash recycling

Other presentations looked at the benefits of closing the material and nutrient loops with fines removal and ash recycling. Recent research points at advantages from sifting the fine particles from wood chips prior combustion and returning or keeping these in the forest. Advantages cited include reduced ash and moisture content and increased heat content of the wood chips whereas the removed fines enables a higher share of nutrient elements in the forest, and through faster decomposition processes of these particles returns nutrient elements faster into the biological nutrient cycle.

Micro- and medium CHP

About 2100 small- and large-scale biobased heating systems are operational in Austria, where a large share of the smaller systems are

owned and operated by farmers and forest estates. Like speaker Tobias Ilg from EnergieWerk Ilg GmbH, a micro-combined heat and power (CHP) plant in Dornbirn, who told of his practical experiences with the Syncraft Engineering wood gasification micro-CHP system.

One of the challenges district and local heating utilities in Austria and elsewhere in the EU face are the emission limits for medium combustion plants (MCP Directive emission limits – 1MW to 50MW). This EU directive, which came into force in May this year, was discussed and it was generally agreed that the transition periods until 2030 should allow sufficient time for upgrades to reach compliance with the new emission limits.

Other highlights of this session included examples of integration of solar thermal and heat pump systems into local heating systems, which make economic sense to cover base loads throughout the warmer periods of the year, leading to higher system utilisation rates and lower per MWh costs.

A fast walk-through from different manufacturers about exciting developments of wood-gasification, micro- and small CHP systems, showcasing the latest improvements in this sector highlighted by the achieved above 8 000 hours per annum system availabilities, which is crucial for industrial applications. Presentations about technical issues included leakage warning and detection systems, legionella and other hygienic threats in water and air supply systems and the importance of water quality in the pipe networks put a focus on the challenges operators are faced with. Biomass supply logistics, safety in heating plants and the importance of proper insurance of such plants as well as the directors and officers liability insurance complemented the second day of this well organized event.

Congratulations and happy birthday to the Austrian Biomass Association’s 20th anniversary!

Text: Robert Fischer

Photos & illustration courtesy ABA

BI83/5118/AS

Vermeer names new President and CEO

US-based underground construction, surface mining, tree care, environmental and agricultural equipment manufacturer Vermeer Corporation has announced that effective November 2015, Jason Andringa will serve as the company’s President and CEO. Prior to becoming president and CEO, Andringa served as president and COO. This announcement was first made in August 2014, as part of the family-owned company’s succession planning.

– I’m excited, honoured and humbled to have the opportunity to continue my family’s legacy of leadership at Vermeer into the third generation. We will continue to fulfill our promise to our customers by capitalizing on our strengths - innovative, high-quality products; entrepreneurial dealers; and the diligent practice of continuous improvement while continuing to create opportunities for growth with today’s fast-moving customer expectations in

mind,” said Jason Andringa who joined Vermeer in 2005.

Mary Andringa, current CEO and chair of the board, will continue the role of chair of the board.

– It’s been a great honor and privilege to be CEO. I am confident in Jason and the entire team who will continue the work that’s been happening here for the last 68 years as they lead this company into a bright future,” said Mary Andringa.

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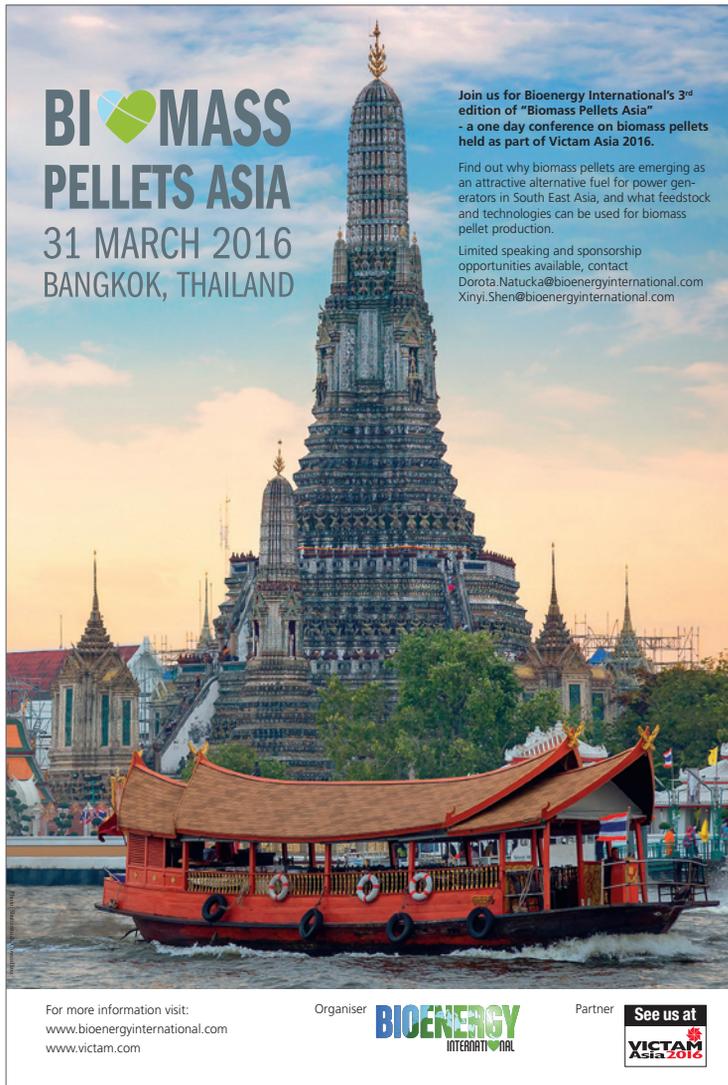
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BIOENERGY RISING IN THE UKRAINE

Given recent geo-political events it is hardly surprising that increasing energy independence is one of the top priorities for the Ukraine. According to Dr Georgiy Geletukha, chairman of the Bioenergy Association of Ukraine (UABio), biomass can contribute significantly to this process as it can directly displace imported fossil gas used for thermal energy.

IN HIS OPENING ADDRESS Dr Georgiy Geletukha highlighted the crucial role of biomass in Ukraine at the 11th International Conference on Biomass for Energy held in Kiev at the end of September. These and other issues for Ukraine's bioenergy sector along with possible solutions to them were discussed very actively by the some 200 national and foreign experts that attended.

– Such substitution of natural gas by biomass, around 2 billion m³ per year, was achieved already in 2013 and the goal of the new National Renewable Energy Action Plan is to almost quadruple this to 7.2 billion m³ annually by 2020, Geletukha explained.

Substantial progress and potential

According to Geletukha there has been substantial progress in the development of bioenergy in the country recently. From 2012 to 2013 the contribution of biomass to the total primary energy supply increased from 1.54 Mtoe to 1.84 Mtoe.

– Growth was 23 percent in one year. An even greater increase in the bioenergy sector is forecasted in the coming years. Ukraine's renewable energy market becomes ever more essential, especially with the high gas price and the adoption of green-tariff price incentives in 2009 for electricity from renewable energy sources, said Geletukha.

The Ukrainian government recently set a green tariff for power produced from renewable sources that is two times higher than the wholesale price for power produced from traditional sources. However, at the moment the government seems to be ready to adjust its earlier energy strategy.

Geletukha referred to Ukraine's energy strategy target, a level of 10 percent renewables by 2030. The potential, he said, is much higher.

– Ukraine is at the very beginning stages of its alternative energy development. Biomass represents more than two-thirds of Ukraine's total estimated renewable potential thanks to the country's traditional agriculture focus. It currently produces less than 1 percent of its energy from biomass, but it is estimated it could produce 10 times more. US\$1-2 billion is needed to install 12 GW of wood and straw combustion capacity, Georgiy Geletukha explained.

He also said that it is important to stress the importance of energy efficiency projects in Ukraine. Businesses and households are not yet efficient in terms of energy consumption.

Several conference presentations mentioned the fact that Ukraine is still at the beginning of rebuilding its sectors and making them energy efficient, but there are already numerous promising biomass projects.

Investors are ready

One domestic investor KSG Agro, has plans to build a 2.5 MW biogas plant in 2017 for US\$7 million (≈EUR 6.15 million) using pig manure. This will come from a new EUR 5 million pig-gery project planned for 2016. This will be a modern breeding plant for 1 280 sows of Danish origin. At present, KSG Agro has a difficult task to restructure debts and sell 28 000 hectares of land in the Crimea, which is one third of the total area of the company.

EcoEnergy Scandinavia, a Swedish renewables developer, has signed a memorandum of understanding (MoU) to construct a 100 MW biofuel plant in Ukraine. The development and initial phase of construction will require an investment of US\$120 million (≈EUR 106 million), according to the Dnipropetrovsk Regional State Administration (DRSA). The Investment Centre at the DRSA has proposed three sites for the plant, at which EcoEnergy will eliminate all landfill in Dnipropetrovsk, according to its contract. EcoEnergy has several projects across Eastern Europe and Russia, including a 8 MW biomass heat plant in operation in Kaliningrad.

Beet pulp, a residue from the sugar industry, is also gaining increasing interest as a feedstock and this year's sugarbeet season will see the first biogas plant in the country using beet pulp. According to Peter Kucheruk a member of the Expert Council of the Ukrainian Bioenergy Association, Ukrainian sugar plants have a capacity to produce up to 3.5 million tonnes of sugar. An important pilot project was Globinskiy sugar refinery in the Poltava region, by company Astarta-Kiev. A number of Ukrainian sugar factory owners have now announced plans to build such facilities.

EBRD largest investor

The European Neighbourhood Instrument (ENI) is awaiting bioheat projects for the period 2015-2020. There is a budget based on the current price for energy for public buildings, including hospitals and schools of EUR 55 per megawatt of heat. The aim is to install biomass boilers in villages and cities and to ensure the supply chain.

The European Bank for Reconstruction and Development (EBRD) is the largest investor in the energy and environmental sectors of Ukraine. The Bank has already financed a project in Lviv, western Ukraine, where large biogas plants will be built at the wastewater treatment plant (WWTP).

Other international agencies have funding programmes that are applicable in Ukraine. The



Dr Lesya Matiyuk, expert for EU and International Cooperation at the Agency for Renewable Resources, is coordinating the green business and policy consulting project "BIO-PROM", which is promoting sustainable production and use of bioenergy in the Russian Federation and Ukraine.

United Nations Development Programme (UNDP) has initiated the recovery of biogas at municipal landfills including the production of electricity; the US Agency for International Development (USAID) has launched a programme for the financing of local energy supply projects based on biomass; and the Nordic Environment Finance Corporation (NEFCO) from Scandinavia offers financing for small-scale investments up to several hundred thousand EUR.

Ukraine also has a vital market of sunflower husk pellets. Two processing plants are due to be put into operation during this year alone, with a processing capacity of 5 000 tonnes per day.

Dutch know-how

A special seminar on Ukraine-Netherlands Bioenergy Cooperation took place during the conference. Efficient bioenergy implementation in Ukraine was debated and Dutch companies presented their experience in the development of bioenergy in anaerobic digestion, combustion, co-firing and energy from waste, biofuel production and the biobased economy both from research and industrial points of view.

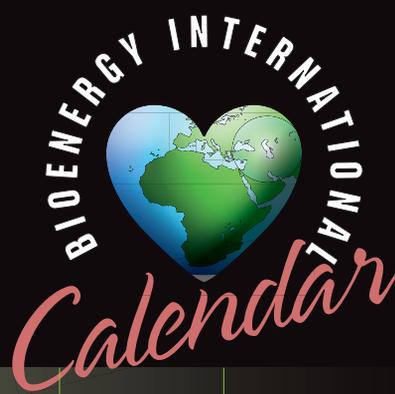
Several foreign participants criticised the confusing signals the present Ukrainian government has sent by increasing taxation on domestic gas production, only to follow by stating its intent to provide incentives to increase investment in domestic production. This leads to an unstable investment climate that favours political insiders who can seize depressed assets for their own use. The seminar also focussed on exploring cooperation possibilities for developing joint projects in bioenergy.

All things considered this year's biomass conference was thoroughly hopeful despite many as-of-yet unresolved problems.

Text & photo: Markku Björkman

B183/5040/AS

The calendar is updated regularly on
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JANUARY 2016			
18-19	Fuels of the Future 2016	Germany	www.fuels-of-the-future.com
18-21	World Future Energy Summit	UAE	www.worldfutureenergysummit.com
20-21	Lignofuels 2016	Germany	www.wplgroup.com/aci/conferences/eu-eef8.asp
26-27	5 th Starch World Asia	Thailand	www.cmtevents.com
26-28	Biomass & BioEnergy Asia 2016	Thailand	www.cmtevents.com
27-28	Biogaz Europe 2016	France	www.biogaz-europe.com
FEBRUARY			
02-03	Pellets 2016	Sweden	www.svebio.se
03-06	Fieragricola	Italy	www.fieragricola.it/en
23-24	Biomass Trade & Power Europe	Denmark	www.cmtevents.com
23-25	F.O. Licht's Sugar and Ethanol Asia Conference	Thailand	www.sugarethanolasia.com
24-26	European Pellet Conference 2016	Austria	www.pellets16.eu
24-26	World Sustainable Energy Days 2016	Austria	www.wsed.at
MARCH			
05-06	Agro Park	Poland	www.agro-park.pl/en
06-09	ECO-BIO 2016	Netherlands	www.ecobioconference.com
14-17	World Bio Markets 2016	Netherlands	www.worldbiomarkets.com
15-17	Bois Energie 2016	France	www.boisenergie.com
29-31	Victam Asia 2016	Thailand	www.victam.com
31	Biomass Pellets Asia	Thailand	www.bioenergyinternational.com
29-31	Bio-Energy China	China	www.bio-energyexpo.cn
30-01	Northeast Biomass Heating Expo 2016	USA	www.nebiomassheat.com
APRIL			
05-07	ViaExpo	Bulgaria	www.viaexpo.com
05-07	Argus Biomass 2016	UK	www.argusmedia.com/euro-biomass
11-14	International Biomass Conf. & Expo	USA	www.biomassconference.com
14-15	InEnergy 2016, Innovative Energy	Poland	www.inenerg.com
19-21	Nordic Baltic Bioenergy	Lithuania	nordicbalticbioenergy.eu
20-21	RENEXPO Western Balkans	Serbia	www.renxpo-belgrade.com
20-22	BioEnergy Italy 2016	Italy	www.bioenergyitaly.com
21-22	European Algae Biomass 2016	Germany	www.wplgroup.com
MAY			
04-05	All-Energy Exhibition & Conference	UK	www.all-energy.co.uk
10-11	Regatec 2016	Sweden	www.regatec.org
11-13	CEB, Clean Energy Building 2016	Germany	www.cep-expo.de
12-14	5 th Power & Energy Kenya 2016	Kenya	www.expogr.com/kenyaenergy
16-19	7 th Biomass Pellets Trade & Power	Japan	www.cmtevents.com
24-26	International Wood Biorefining Week	Sweden	www.iwbweek.com
24-26	World Bioenergy	Sweden	www.worldbioenergy.com
25-27	Biogas Asia Pacific Forum 2016	Malaysia	icesn.com/bgap2016
30-3 June	IFAT	Germany	www.ifat.de
JUNE			
03-05	2 nd Power & Energy Tanzania 2016	Tanzania	www.expogr.com/tanzania/powerenergy
06-09	24 th European Biomass Conference and Exhibition	Netherlands	www.eubce.com
09-12	KWF Tagung	Germany	www.kwf-tagung.org
15-17	International Bioenergy Conference & Exhibition	Canada	www.bioenergyconference.org
21-22	Oleofuels 2016	UK	www.wplgroup.com/aci/event/oleofuels/
21-23	Renewable Energy World Europe	Italy	www.renewableenergy-europe.com
21-23	POWERGEN Europe	Italy	www.powergeneurope.com



Biogaz Europe

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