BIOENERGY

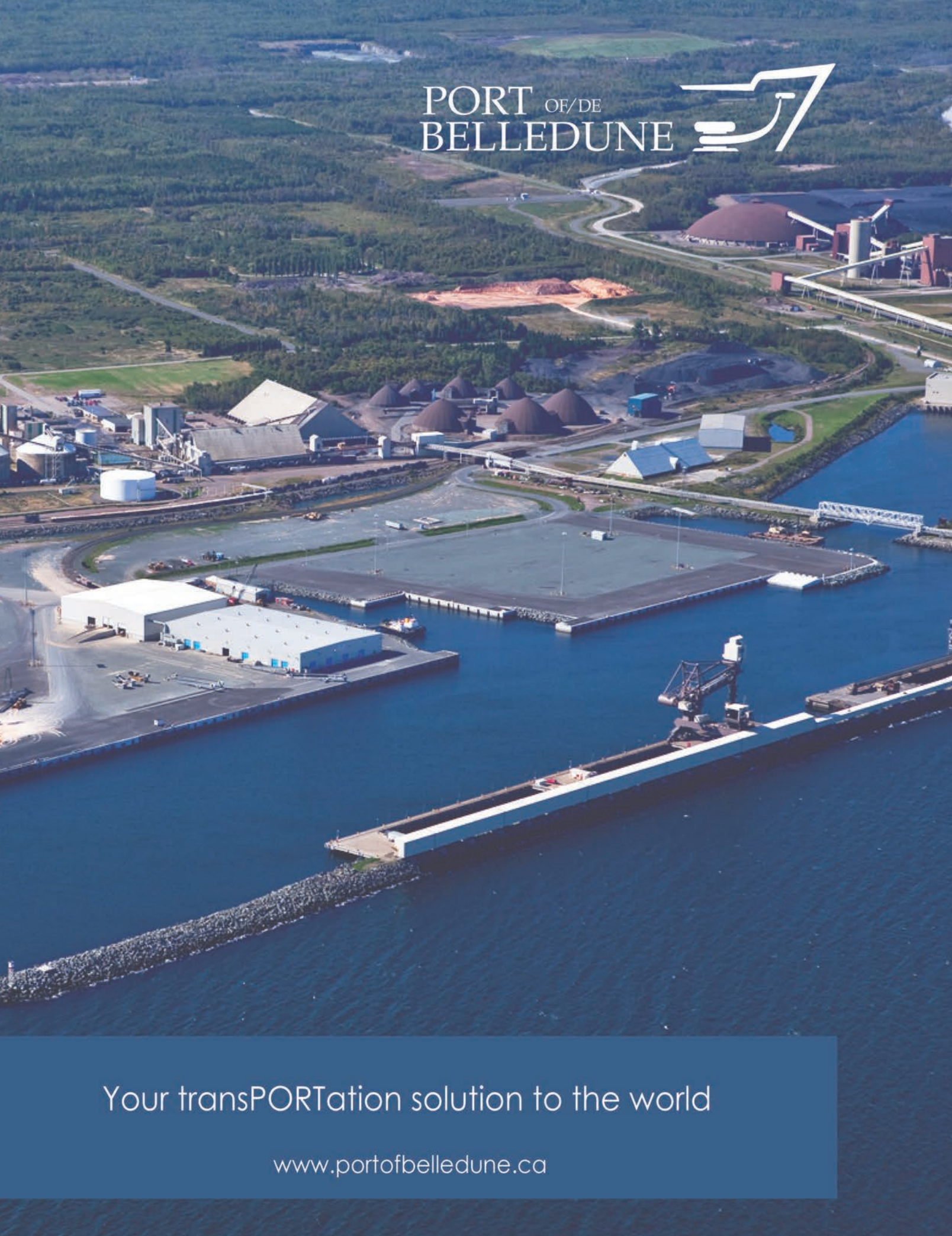
The Official World Bioenergy Association Magazine

NO 7 2019

WORLD BIOENERGY ASSOCIATION

Bioenergy as a Sustainable Renewable Solution

ALSO INSIDE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A Message from the President of the World Bioenergy Association

Exceptional Benefits of Bioenergy:
Sharing Best Practices & Success Stories

DEAR READERS,

Welcome to the seventh edition (second redesigned issue) of *BIOENERGY,* the official World Bioenergy Association magazine. This publication is part of our ongoing process of promoting bioenergy globally on a sustainable level.

Since the sixth edition was published in October 2018, major changes have happened globally. COP24, the climate change conference in Katowice, Poland, concluded with the *Katowice Rulebook* being adopted. The rulebook provides a pathway for all countries to raise ambition to implement the *Paris Agreement*. The rulebook has come at a very crucial juncture in our global climate crisis. Published a few weeks before COP24, the Intergovernmental Panel on Climate Change, (IPCC) released a special report on the impacts of global warming of 1.5°C. The report provides an ultimatum to the world, stressing that we must take drastic steps over the next 12 years to have any meaningful opportunity to limit global warming and the resulting catastrophic climate change.

A key message from the international scientific community is that we must reduce carbon emissions by 45 per cent by 2030 and achieve net-zero emissions by mid-century. This effectively means that all new developments of coal-fired plants should be halted in the next couple of years and that renewable energy technologies and energy efficiency should be pushed at a much more rapid pace than ever before.

Bioenergy is at a very important juncture in the global energy mix. As stated by the IPCC, "…use of biomass can be higher…due to potential to replace fossil fuels across all sectors (high-confidence)." It is acknowledged internationally that bioenergy plays an important role alongside other renewable energy sources. Bioenergy is a versatile energy source with a multitude of feedstock and end uses—electricity, heating / cooling, and transport fuels. It is time for the local, national, regional, and international stakeholders of the bioenergy sector to gather, discuss, debate, inform, and educate on the exceptional benefits of bioenergy by sharing best practices and success stories.

With over 250 members from over 60 countries comprising policymakers, researchers, private sector, and civil society, the World Bioenergy Association (WBA) is in a strong position to push for sustainable development of bioenergy on an international level. Our factsheets inform and educate on the latest developments in each bioenergy sector. The annual statistics report is a comprehensive document providing the latest data on solid biomass, liquid biofuels, and biogas sectors. Our events and networking sessions provide a great platform for our members and the international bioenergy community to discuss and debate the position of bioenergy and its role in the global energy mix. Our international collaboration with leading energy and climate organizations offers further evidence on our position as a reliable and unbiased association for promoting and developing bioenergy.

In 2018, some of WBA's accomplishments included publishing a factsheet on optimizing the supply chains of bioenergy development, releasing the latest statistic report detailing bioenergy data worldwide, organizing workshops for delegations from Ukraine and China, planning a high-level forum on bioenergy in Katowice, organizing a study mission trip to China, and participating actively at COP24.

In 2019, we are pleased to invite you all to our annual meetings, which will be held in Georgia, USA. The event will include site visits to leading pellet installations in southeastern USA and participation at an important event in Athens, Georgia focusing on pellets and bioenergy. More information is available on our website, www.worldbioenergy.org.

Remigijus Lapinskas
President
World Bioenergy Association

To the readers and non-WBA members, we invite you all to join our association and strengthen our position. Membership is available for various categories and fee structures, depending on member characteristics. You can choose to sign on as an individual, a company, or an association. Joining as a member will keep you updated on the latest developments in bioenergy, privileged access to participate in and present at WBA events, discounts or free passes to attend other international bioenergy / clean energy events, and a platform on the WBA website to promote your research and services worldwide.

Join the voice of the international bioenergy community.

We hope to see you as a member soon!

BIOENERGY

NO 7 | APR. 2019

Published for:
THE WORLD BIOENERGY ASSOCIATION
Kammakargatan 22, 111 40
Stockholm, Sweden
Phone: +46 (0)8 4417084
info@worldbioenergy.org • www.worldbioenergy.org

Published by:
Matrix Group Publishing Inc.
Publication Mail Agreement Number: 40609661
Return undeliverable Canadian addresses to:
309 Youville Street
Winnipeg, MB R2H 2S9
Toll Free Phone: (866) 999-1299
Toll Free Fax: (866) 244-2544
sales@matrixgroupinc.net • www.matrixgroupinc.net

PRESIDENT & CEO
Jack Andress

OPERATIONS MANAGER
Shoshana Weinberg | *sweinberg@matrixgroupinc.net*

PUBLISHER
Jessica Potter

EDITOR-IN-CHIEF
Shannon Savory | *ssavory@matrixgroupinc.net*

SENIOR EDITOR
Alexandra Kozub | *akozub@matrixgroupinc.net*

FINANCE/ADMINISTRATION
Pat Andress, Nathan Redekop, Lloyd Weinberg
accounting@matrixgroupinc.net

DIRECTOR OF CIRCULATION & DISTRIBUTION
Lloyd Weinberg | *distribution@matrixgroupinc.net*

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What COP24 Means for Bioenergy Around the World

Attendees gathered at the UN's Conference on Climate Change, COP24, in Katowice, Poland in December 2018.

***By Heinz Kopetz**,*
Senior Consultant, WBA

COP24, more formally called the 24th Conference of the Parties to the United Nations Framework Convention on Climate Change, took place in December 2018 in Katowice, Poland. After long discussions, the negotiators finally reached an agreement. The text invites countries to set tougher targets for cutting greenhouse gas emissions and to follow stronger transparency rules in disclosing their emissions. At the end of the conference, a full compilation of the *Paris Agreement* rulebook had been released.

During the Paris Conference three years prior, in 2015, countries presented pledges to cut greenhouse gas emissions, but the original pledges would not put the world anywhere close to the targets of limiting global warming well below 2°C.

The conference in Katowice was the first to ramp up the voluntary ambitions of the countries involved. **But in this sense, the conference was no success**. Countries decided on better rules for transparency but not on new binding reduction targets for their emissions. There is a big tension between the threat of rising temperature and the fear of economic disadvantages that hinder countries from cutting greenhouse gas emissions. As a consequence, global greenhouse gas emissions reached a record high in 2018 and are climbing higher. If these trends cannot be stopped soon, the *Paris Agreement* will fail.

This was also clearly documented through the many side events held in conjunction with the Katowice conference, during which top scientists and speakers of international bodies spoke in crystal clear language. For example, the UN Environment Program (UNEP) 2018 emissions gap report made it clear that global emissions are 13 to 15 gigatons (Gt) above the 2°C target. "We wasted decades," commented one of the speakers at the event. "Now, we enter the last decade in which we can influence the climate."

In a press conference organized by the World Bioenergy Association (WBA), the association's president, Remigijus

Current WBA President Remigijus Lapinskas and former WBA President Heinz Kopetz at COP24.

Hans-Josef Fell, Energy Watch Group, leads a panel discussion with Beata Kępińska, Polish Geothermal Society; Mathis Rogner, International Hydropower Association; Remigijus Lapinskas, World Bioenergy Association; and Prof. Dr. Tanay Sidki Uyar, World Wind Energy Association at COP24 in Katowice.

Lapinskas, pointed out that in recent years, the share of fossil fuels in the global energy mix was not declining, nor was the share of renewables increasing significantly. As the global demand for energy grows, the production of both fossil fuels and renewables is growing.

In a coinciding event organized in the Polish Pavilion, Dr. Fatih Birol, executive director of the International Energy Agency (IEA), presented a report on the state of the low-carbon economy. Dr. Birol made a remarkable statement on bioenergy.

"Bioenergy is, unfortunately, overlooked in the discussion on renewable energies, although bioenergy covers 50 per cent of all RES and its contribution is bigger than that of wind, solar, and hydro," Dr. Birol said at the event. "The IEA, with its experts in Paris, will do its best to push modern bioenergy to a much higher level and bring it the attention it deserves." This statement was strongly supported by the WBA. It is not sufficient to push only for wind and solar as the only sustainable renewable solutions (as is done in many countries), nor is it sufficient to overlook bioenergy. This was the new and important message from the IEA.

Anticipating the current energy situation, the WBA formulated a Fossil Fuel Exit strategy (FES) years ago and demanded the elimination of all subsidies for fossil fuels and the introduction of carbon taxes as the most important steering instruments for transitioning the energy system toward renewables. Today, these WBA proposals are more urgent than ever before. The warning voices of many top officials in Katowice have spoken. In short, the world is not on track to meet the 2°C target. It is time to leave fossil resources in the ground and switch to renewables—bioenergy, hydro, wind, geothermal, and solar—as quickly as possible, and it is time to focus on energy efficiency measures worldwide.

Participants flocked from around the world to take part in COP24 and discuss the importance of global climate change.

In the energy transition to reach climate targets, bioenergy will have to play an important role in all markets: electricity, heat, and transport. Cogeneration of biomass in small or bigger units is an important strategy to compensate for the intermittent electricity supply of wind and solar power. In addition, bioenergy is the cheapest way to store energy for heating purposes from summer to winter, and biofuels are a readily available option to reduce emissions in transport. This growing contribution of bioenergy is urgently needed in order to break the dominance of fossil fuels and cut greenhouse gas emissions quickly enough to comply with the 2°C target. ■

Read the WBA Fossil Exit Strategy online at https://worldbioenergy. org/news/93/47/wba-fossil-exit-strategy.

The Key Role of Liquid Alternative Fuels for Climate Protection: Time is Running Out

By Prof. Dr.-Ing. Thomas Willner,
Hamburg University of Applied Sciences

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) special report on global warming of 1.5°C[1] presented an updated remaining carbon dioxide budget of 420 gigatons (Gt) from the beginning of 2018 onwards for a 66 per cent probability of limiting warming to 1.5°C. Since the annual carbon dioxide emissions are at a level of 40 Gt, and since 2018 is over, the rest of the budget is just 380 Gt today, being reduced by 40 Gt each year. Thus, without any action for carbon dioxide reduction, the budget will be exhausted in fewer than 10 years, by about 2028.

Therefore, fast reduction of carbon dioxide toward zero emission at the end must start immediately. Figure 1 (below) provides a roadmap for orientation on how the budget can by kept by a linear carbon dioxide reduction to zero in 2038. This means an average annual reduction in carbon dioxide emissions of five per cent, based on today's level. The target year of 2050, which has been cited time and again, is now far outside the range. We have already lost too much time doing nothing.

From this analysis, the key messages that emerge for policymakers are:

1. Significant global carbon dioxide reduction must start immediately in every single country of the world;
2. Long-term goals must be set, but that is not enough;
3. In addition, annual milestones are needed, based on the roadmap shown in Figure 1; and
4. All technical possibilities must be involved.

These recommendations apply to all sectors of the economy, including the transport sector, which is discussed in this article.

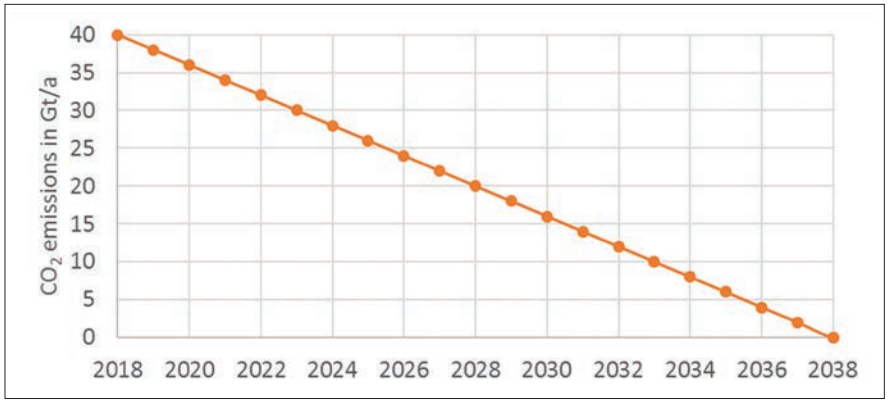

Figure 1. Annual global net carbon dioxide emission with linear reduction to zero in 2038 keeping the budget.

Carbon dioxide mitigation in the transport sector by biofuels

The involvement of the mobility sector in climate protection is a global challenge. So far, there is no generally accepted solution to the problem. The global transport sector accounts for 29 per cent of final energy consumption and 20 per cent of carbon dioxide emissions.[2] Thus, the transport sector is an important issue for climate protection.

Due to the very short time of about 20 years remaining, the entire existing fleet must be involved in carbon dioxide mitigation, by all available means. There is no longer sufficient time for the protracted replacement of the vehicle fleet and the conversion to a new drive system, like electric or hydrogen mobility. For this reason, both electric and hydrogen mobility alone have no chance of achieving the greenhouse gas reduction targets in time.

Instead, alternative liquid fuels, especially biofuels, will have to bear the main

burden of climate protection in the transport sector. The challenge will be in producing the required quantities of biofuels in a short period of time. The global annual energy demand of the transport sector is about 115 exajoules.[2] More than 95 per cent is based on liquid fuels, and the global share of biofuels is about three per cent.[2]

According to a forecast of the International Energy Agency (IEA), the energy consumption for transport will not decrease significantly until 2040, even in the 'Sustainable Development Scenario',[2] in spite of improving efficiency and efforts toward electric and hydrogen mobility, but due to growing population and increasing standard of living.

Biofuels will definitely not be a transitional solution. In particular, fast-growing areas of transport such as aviation, marine shipping, and heavy road transport, and also part of the passenger cars transport (e.g., hybrid cars) will be dependent on liquid fuels in the long-term.

A persistent myth is that the biomass potential is too low. In reality, global biomass growth far exceeds the demand for biofuels. The carbon demand for all the world's fuels corresponds to less than two per cent of the world's naturally growing and equally dying bio-carbon.[1, 2] Therefore, the dying side of biomass—including wastes and residues—is 50 times more than we need for 100 per cent of fuels. As an example, according to the Food & Agriculture Organization of the United Nations[3] about 30 per cent of all food is wasted worldwide, accounting for the huge amount of 1.3 billon tonnes annually.

> The target year of 2050, which has been cited time and again, is now far outside the range. We have already lost too much time doing nothing... Significant global carbon dioxide reduction must start immediately in every single country of the world.

A recently published position paper by ProcessNet, a joint initiative of the German Society for Chemical Engineering and Biotechnology and the Association of German Engineers / Chemical Engineering,[4] describes a variety of transformation pathways for obtaining advanced liquid alternative fuels, mainly new biofuels, in addition to biofuels already in the market. Many advanced biofuels overcome blend-walls of conventional biofuels such as biodiesel and bioethanol. In the end, fuels can be blended with up to 100 per cent of these kinds of advanced biofuels. Examples are pure hydrocarbon biofuels such as hydrotreated vegetable oil.

New technologies have been developed such as new decentralized synthesis gas processes, partly in combination with renewable electricity—Power to Liquid (PtL) or Power to Gas (PtG), or new, highly efficient and cost-reducing direct liquefaction processes in combination with hydro-refining.

A number of new processes have reached technology readiness level 8 (TRL 8)[4] Technological approaches are sufficiently available, but they require financial support for scaling and implementation. Strong action, along with more ambitious new legislation and policies, are needed to activate the urgently needed investment potential for accelerating relevant technology development. ■

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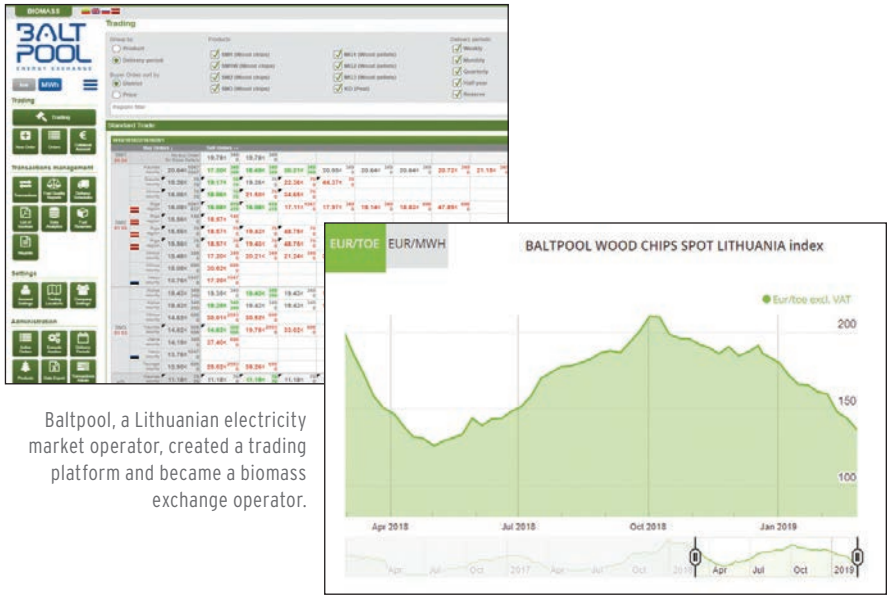
New-Age Biomass Trading Systems: Lithuania Has Already Changed its Approach – Biomass is a Commodity

***By Vaidotas Jonutis**, Head of Trade Division, Baltpool, Lithuania*

In Lithuania, the heating season is half a year. So, it is not surprising that heat energy is the most common form of energy consumption in the country. The district heating system (the centralized network provides heat for about 50 per cent of all customers) generates more than nine terawatt hours of heat energy. According to 2017 data, 69 per cent of heat in the centralized network is produced using biomass. The country's political goal remains to reach 80 per cent by 2020.

Biomass is a strategic energy resource in Lithuania. Therefore, it is natural that, in order to establish a transparent and fair market price, politicians have turned to electricity and natural gas trading platforms that are already operating on the market. Lithuanian electricity market operator Baltpool was obliged to create a trading platform and become a biomass exchange operator.



Baltpool, a Lithuanian electricity market operator, created a trading platform and became a biomass exchange operator.

The main challenges that were overcome by creating a new trading model included:

- Standardized products. The wood pellets market has been standardized for many years, but the main biomass product used in Lithuania is wood chips. During the development of product specifications, most boiler house products were reviewed, and the four most commonly used ones were purified. As practice has

shown, four products cover almost the entire demand of customers. Currently, the biomass exchange trades four wood chip, three wood pellet, and one peat product. The main parameters determining the fuel quality are moisture content, ash content, calorific value, and chlorine and sulphur content.

- There is no existing energy transmission system in the biomass market. Electricity and natural gas have a transmission system operator that not only delivers energy resources at the same cost to consumers but also compensates for the undelivered amount (balancing). Baltpool presumes that the transmission system is based on the road network of motorways. Each supplier can indicate the costs of its transmission system (biomass logistics costs), which are included in the final price of the biofuel sold.
- Standardization of procedures for quality inspection, delivery, and acceptance of biomass. The operator determines the rights and duties of both parties in detail in order to balance it.
- Classification of participants. In order to create maximum supply and fulfilment of obligations in the market, it was necessary to give participants different categories because not everyone can fulfil similar obligations. For example: long-term transactions can only be made unrestricted by the highest category of participants; or all participants can trade in the SPOT market.
- Trading type: open auction. This way has allowed us to abandon the black box auction lottery and create a transparent and fair market price.

Participants submitting orders to the trading platform provide warranty in cash or a bank guarantee. At present, there are about five million euro-denominated guarantees to compensate for potential contractual discharges. It should be noted that all contracts are executed, and collaterals are not used.

The success of the biomass exchange was due, in large part, to the fact that small suppliers began to participate in biomass tenders, whose activity was previously restricted as a result of buyers' unwillingness to have commercial relations with small players. Because the number of transactions for buyers has increased considerably, Baltpool also introduced modules that allow the administration of a large number of transactions—the biomass quality, alignment of the deliveries, settlement instructions, schedule for delivery, and publication of essential events in the market.

In 2018, about 6,000 transactions were concluded in the Lithuanian biomass exchange, and in some cases, buyers had 50 different suppliers per year. As the exchange has created the SPOT market, more than half of the deals are being traded there.

The price of heat for consumers dropped by 30 per cent over the last five years, mainly due to a shift from natural gas to cheaper biomass and a fall in the price of biomass resulting from the emergence of a transparent market.

Baltpool started development in foreign markets. Since 2017, similar services have been provided in Latvia. Baltpool also signed an agreement with partners on similar activities in Denmark and Finland. In addition, Baltpool actively looks for like-minded partners for opportunities to cooperate and share knowledge. ■

UAB Baltpool is an operator of the Lithuanian Biomass Exchange which has the right to organize trade in biomass and other products. In 2018, Baltpool started to handle heat auctions and the timber trading system. The company also administers public interest services.

Agricultural Residues: A Blessing or a Curse for China?

***By Kelvin Hong**, Great Resources (Jilin) Co. Ltd., China, & Vice-President, WBA*

Over the past few years, increasing population and economic growth has led to increasing pollution of air in major urban cities around the world. China, the largest country in the world (in terms of population) is confronted with similar challenges in combating air pollution: reducing carbon emissions and pollutants. The use of fossil coal and outdoor burning of straw are the root causes of air pollution in several parts of China, especially in north-eastern China.

Turning to renewable energy by processing biomass into pellets is key in winning the battle of reducing emissions and using cleaner energy. One of the major, unexploited biomass resources in China is the availability of agricultural residue, which is estimated at more than one billion tonnes annually. This potential is both an opportunity and a challenge for China in efficient use of the huge amount of biomass resources.

In the recent past, favourable governmental regulation and active participation

> Agricultural residue is low-hanging fruit and is more preferable pellet feedstock than forestry residue in China. We can unlock the huge potential of agricultural residue by converting it into renewable energy!

Figure 1: China's 13th five-year plan for biomass.

Development Goals of The 13th Five-Year Plan for Biomass					
Use Pattern	Scale		Annual Output		Replacing Fossil Fuels (Mt / Year)
	Amount	Unit	Amount	Unit	
Power Generation	15	MKW	90	Billion KW	26.60
Biogas	-	-	8	Billion KW	9.60
Biomass Briquette Fuel	30	Mt	-	-	15.00
Biology Liquid Fuel	6	Mt	-	-	6.80
Biofuel Ethanol	4	Mt	-	-	3.80
Biodiesel	2	Mt	-	-	3.00

of civil society and the private sector have enabled the biomass sector to grow. Looking ahead, biomass resources will play a significant role in China's energy security, considering more than 800 million tonnes of coal resources are burned in China every year and must be replaced at a rapid pace. Moreover, biomass energy brings about added socio-economic benefits such as contribution to the local economy and poverty alleviation in rural areas of China.

Biomass is now an important renewable energy in China after more than 10 years of growth. In particular, the sustainable growth of the biomass heating industry has been a driving force of transforming and upgrading agriculture, the industry, and service sectors.

Economics of biomass power plant

Economically, the OPEX (operating expenses) of a heat plant running on biomass is almost equal to a coal-fired plant installed with emission technology to reduce nitrogen oxides (selective catalytic reduction / selective non-catalytic reduction). The cost is only 60 to 70 per cent of a natural gas plant, with emissions similar to natural gas. The cost-competitiveness makes biomass the best option for replacing coal as a clean energy in northeastern China as well as rest of the country. Biomass heating is the only option in the renewable energy industry that survives the market in China without subsidization.

Latest policies and capacity building

In terms of policy, *Guidance for Promoting the Development of Biomass-to-Heat* issued by the National Development and Reform Commission in December 2017 defined the industry qualitatively. In the same month, *Planning of Clean Heating in Northern China (2017-2021)* jointly issued by 10 ministries defined the industry quantitatively. It indicated replacing coal with electricity up to 1.5 billion square-meters (m^2), replacing coal with natural gas up to 1.8 billion m^2, and replacing coal with biomass up to 2.1 billion m^2. An institute specializing in pellet quality analysis and biomass boiler system monitoring has also been established in Northern China, along with workstations headed by renowned academicians.

In summary, China will live up to its commitment in renewable development by expanding the agricultural residue-based biomass heating industry and setting up the concept of circular economy. ■

Figure 2: Supplying Clean Heat in Winter in Northern China (2017-2021) jointly issued by 10 ministries.


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Figure 3: Agricultural residues, like the peanut shells, rice husk, and straw shown on page 12, can be converted to energy.

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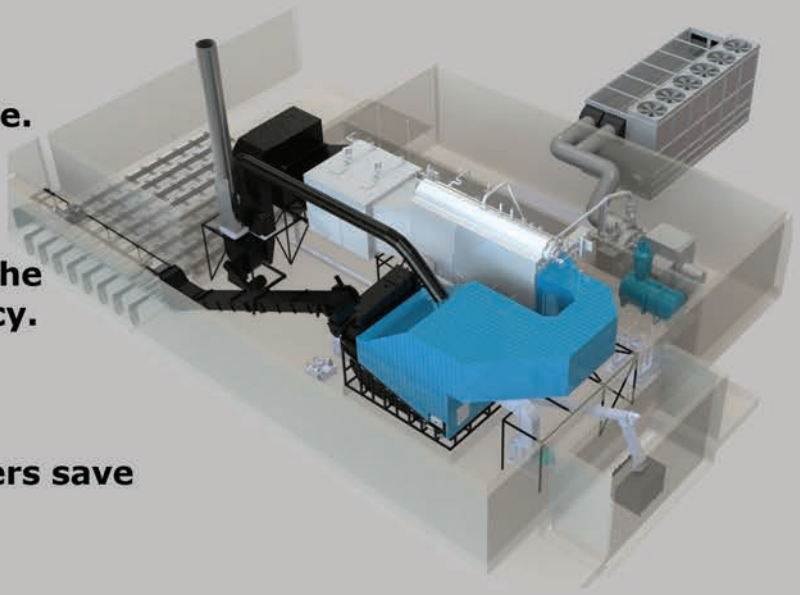

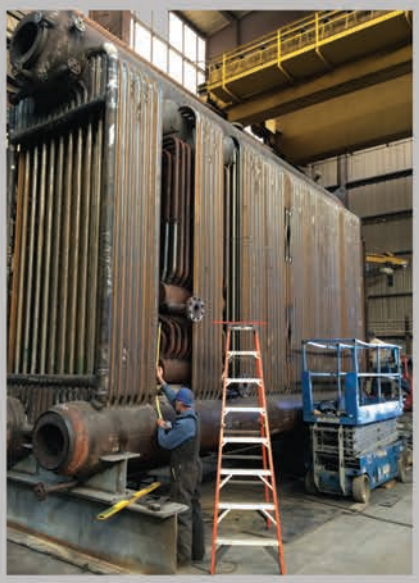

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FEATURE

The Myths & Misconceptions About Bioenergy: Part II

On one hand, cereal straw is a byproduct of food production and can be a significant source of energy, including transport biofuels. Taking off only about 50 per cent of straw allows the next crop to be sown in a more energy-efficient way into the remaining stubble, while using the removed portion to fully replace energy from fossil fuels.

***By Andrew Lang**, Senior Consultant, WBA*

Myth: Production of Biomass Means Less Food Production

A constant argument made against using biomass for energy and for expanding bioenergy production, say, for transport biofuels, is that doing so inevitably takes land away from the production of food and fibre. While this might be the case if all land was used for producing biomass solely for energy production, biomass production is a far lower value use of land than food production, so this won't happen while there is a demand for food.

In almost every case worldwide, biomass entering any energy production system is a very low value—or even valueless—byproduct of, or residue from:

- Forest harvest or timber processing;
- Production or processing of food; or
- An urban waste stream.

And it is clear that biomass production can be increased significantly, even in major food production areas, like the American Midwest, Australia's broadacre cropping regions, and the Ukraine, or in countries like Turkey, Sudan, Argentina, South Africa, and China.

It has been shown conclusively in Australia—and many other countries—that planting five to 15 per cent of farm area with strips of trees across the prevailing wind direction will lift productivity of sheltered crops or pasture significantly; more than offsetting the loss of production from land area now under trees. The trees reduce wind speed across the area downwind for a distance up to 10 times the tree height, approximately 150 to 200 metres. This means reduced evaporation at the soil surface (plus, soil moisture being available for plants for longer) and reduced losses of cultivated soil and fertilizer due to wind erosion.

The trees, while providing shelter and actively sequestering atmospheric carbon and producing oxygen year-round, also provide a habitat for pollinating insects, like bees, and bird and bat species that eat pests from crops and the pasture. Trees' deep root systems bring nutrients up from deeper soil horizons, and these nutrients are distributed onto the soil surface in leaves, twigs, and bark. In a more regular and close mode of planting, like with single rows of poplars around fields in parts of China, the shelter provided has humidity levels within the enclosed fields that are significantly higher than in unenclosed fields. As a result, these trees are effecting a change in the local microclimate. This is obviously a good thing where climate change means reduced rainfall and increased evapotranspiration.

For livestock producers, the same benefits result from shelter plantings:

- Milk production is better when animals have shelter and shade;
- Sheltered animals need less food to maintain ideal weights;
- Falling leaves, twigs, and bark of some species will provide extra fodder; and
- Mortality of young stock is less common, and their health and growth rates are better.

Thinnings and heads from sawlog or pole harvest from these shelter belt plantings provide significant biomass and firewood, which offers an additional source of income for farmers or a reduced outlay on purchase of fuels for cooking and heating. On a regional scale, the aggregate biomass that can be produced by tree plantings on farms can fuel a local energy plant, with the heat produced being used for local value-adding industries. Planting more trees in areas of food production can only be a positive thing, provided the species chosen are suitable and that the design of plantings is well-informed. The potential is there for rural communities to sustainably produce all the biomass needed to be energy self-sufficient. At the same time, the potential is there for their food and fibre production and farm productivity to be enhanced and for their farm income to be improved. Well-designed plantings mean many of the risks associated with climate change will be mitigated. It is hard to understand how anyone could find fault with this outcome. ■

On the other hand, the plantings of some commercial tree species that are lifting farm productivity by providing shelter and improving crop and pasture microclimates and shade and shelter for livestock, can also produce thinnings able to produce food products like shiitake mushrooms (as here with these eucalypt thinnings), and after two or three years, when exhausted for more fungal fruiting, these short lengths can be used for energy production.

WBA News

At the World Bioenergy Forum 2018 on December 5, 2018, Remigijus Lapinskas presented about the latest developments of bioenergy globally and the stark warning from IPCC on the need for rapid deployment of renewables for combating climate change.

Site Visit 2: A multi generation technology (cogeneration of cooling, heat, power, steam, and fertilizer) plant in Pharmaceutical Industrial Park near Panshi City, located south of central Jilin Province, China.

WBA's booth at COP24 in Katowice, Poland in December 2018 welcomed visitors from around the world to learn about bioenergy and the association's global initiatives.

Site Visit 4: This plant supplies bioheat to vocational educational park, west of Jilin City. The park is located in the northern part of Jilin City, with a heating area up to 960,000 square metres.

The 1st International Bio-Based Economy Forum was held on November 26, 2018 in Changchun, China.

The year 2018 was on track to be the fourth hottest year on record, with average temperatures already close to 1°C above pre-industrial baseline.[1] At the same time, global carbon dioxide emissions are estimated to grow by two per cent in 2018.[2] As the world was heading in the wrong direction, the leading climate science body, the Intergovernmental Panel on Climate Change (IPCC) published its latest report on global warming of 1.5°C. The report provided a clear indication of the drastic efforts required to decarbonize our energy sector as a whole. Time is short, and the global energy and climate community has to speed up its efforts. The World Bioenergy Association (WBA) was quite active in pushing for bioenergy as a sustainable solution, with various events with key stakeholders.

COP24

Global leaders met in Katowice, Poland in December 2018 to develop and agree on a rulebook. After much deliberation and sessions extending over the weekend, a deal was finally achieved. The *Paris Rulebook* provides guidelines for the implementation of *The Paris Agreement*, and it is a clear indication of the willingness of nations around the world to pursue efforts to combat climate change. The WBA appreciated the efforts of COP24 President Michał Kurtyka and his team, along with the United Nations Framework Convention on Climate Change for hosting and concluding negotiations.

At COP24, the message was clear. Time is running out. Researchers implored policymakers to raise ambitions and speed up the renewable energy transition. For bioenergy, it is clear that it will play an important role in the transition. Solid biomass for heat, cooling, and electricity, liquid biofuels for transport, and biogas are cost-effective, dispatchable, and sustainable options to replace fossil fuels. As pointed out in the IPCC report, "The use of bioenergy can be as high or even higher when BECCS is excluded compared to when it is included due to its potential for replacing fossil fuels across sectors (*high-confidence*)."

The WBA, along with its board and members, was active with informing and advocating for bioenergy to civil society, researchers, businesses, and policymakers at COP24.

World Bioenergy Forum 2018

On December 5, 2018 in Katowice, in close proximity toCOP24, the WBA, in cooperation with the Polish Chamber of Biofuels, and the Polish Chamber of Commerce for Renewable and Distributed Energy, organized an international conference called World Bioenergy Forum 2018. The event was devoted to the role of bioenergy as the largest source of renewable energy, which plays a significant and direct role in achieving the international energy and climate goals. Four sessions on policy, solid biomass, liquid biofuels, and biogas included local and international speakers informing attendees about the latest developments, and the networking sessions provided an opportunity for discussion and debate on the best steps for promoting bioenergy, worldwide and in Poland.

Study Mission Trip to Changchun, China

The WBA, in collaboration with its branch office in China, organized a study trip for international delegates to Changchun, Jilin Province from November 26 to 28, 2018. During the study mission, the WBA branch office organized the first Bio-Based Economy Forum 2018, which took place on November 26 and included presentations from local and international experts on bioenergy. The event was supported by the China New Energy Chamber of Commerce and Great Resources (Jilin) Co. Ltd. The forum also served as the venue for the launch of the China-Nordic Bioenergy Investment Kick-Off ceremony to promote technology transfer and investments for bioenergy technologies from Europe to China. At the same time, the *Pioneer of Green Energy* Awards were given to projects with high sustainability and efficiency conditions. For delegates who were part of the study trip, four site visits were organized.

Delegates were also provided an opportunity to visit Changchun's Jilin Museum, which features ethnic groups. The museum visit was followed by a high-level meeting between Vice-Governor of Jilin Province Zhu Tianshu and WBA President Remigijus Lapinskas. The discussion involved strengthening cooperation between the WBA and Jilin Province for promoting bioenergy.

Agro pellets and briquettes for biopower and heat for use in a biomass power plant in Changchun, China.


Meeting between WBA's President and Changchun's Vice Governor in Changchun, China.

Launch of the China Nordic Bioenergy Investment in Changchun, China.

Sweden-Ukraine Bioenergy Cooperation Forum

A high-level Ukrainian delegation comprising policymakers, investors, civil society, and city officials visited Stockholm, Sweden on invitation from the WBA for a two-day study trip from October 23 to 24, 2018. The trip included a one-day event focused on the Sweden-Ukraine Bioenergy Cooperation Forum, which was followed by site visits to bioenergy installations. The forum was organized in cooperation with the Embassy of Ukraine in Sweden and the Swedish Bioenergy Association.

The Sweden-Ukraine Bioenergy Cooperation Forum was attended by both Swedish and Ukrainian stakeholders in the bioenergy and renewable energy sector. The forum offered an opportunity to exchange ideas and best practices for sustainable development of biomass resources to produce electricity, heating, and transport fuels. On the second day, the WBA organized two site visits for delegates to see firsthand the development of bioenergy and waste combined heat and power technology in Sweden. ■

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1. https://www.carbonbrief.org/state-of-the-climate-2018-set-to-be-fourth-warmest-year-despite-cooler-start
2. http://www.globalcarbonproject.org/carbonbudget/18/highlights.htm

Upcoming Events

Stay informed on exciting industry developments by attending these informative events throughout the year.

For more information, visit the WBA's Upcoming Events page, www.worldbioenergy.org/upcoming-events.

For event organizers, if you wish to be included in the list of upcoming events, please contact the WBA Secretariat at info@worldbioenergy.org.

2019 EVENTS

April 8 to 10
Argus Biomass
Argus
London, United Kingdom

April 24 to 25
RENEXPO
REECO
Belgrade, Serbia

April 24 to 26
IRENEC 2019
Eurosolar Turkey
Istanbul, Turkey

April 29 to May 3
WBA Annual Meetings*
WBA, USIPA
Savannah, Atlanta & Athens, Georgia

May 3 to 4
1st International Biogas Conference
World Biogas Association
Athens, Greece

May 22 to 23
Biomass PowerON
Fortes Media
Copenhagen, Denmark

May 27 to 30
27th European Biomass Conference & Exhibition
ETA Florence
Lisbon, Portugal

June 5 to 6
Oleofuels 2019
ACI
Venice, Italy

August 16 to 18
8th Asia Pacific Bioenergy Exhibition
GGIE Group
Guangzhou, China

September 11 to 12
RWM 2019
PRYSM Group
Birmingham, United Kingdom

September 24 to 25
Biomass for Energy
UABIO
Kiev, Ukraine

October (TBC)
Study Mission Trip*
WBA
Queensland, Australia

November 4 to 7
Solar World Congress 2019
ISES
Santiago, Chile

December 2 to 13
COP25
UNFCCC
Santiago, Chile

November 04 - 07
Solar World Congress 2019
ISES
Santiago, Chile

Event listings are current as of March 2019. Exact dates and locations may change.
Please contact event organizers for confirmation.
**** denotes events hosted by the World Bioenergy Association.***

WBA members may get discounts on registration fees. For more information on how you can become a member and represent WBA, please contact info@worldbioenergy.org.

Bring on Biofuels: Markets, Sustainability, Politics, Technology & Opportunities

WBA interviewed Dr. Oliver Lüdtke, COO Bioethanol/Biomethane, VERBIO AG, in February 2019.

The plant shown in these photos is the second of its kind (built in Germany and set into production in two months) for the production of biomethane from straw and bio manure. The technology, developed by Verbio, and this type of plant are worldwide unique. Photos in this spread provided by Verbio.

MARKETS

Q: Verbio's yearly production makes 700 GWh biomethane, 470,000 tons (metric) biodiesel and 260,000 tons (metric) bioethanol. Your products are mainly used as biofuels for the mobility sector. What are your projections regarding the production of biofuels, and where do you expect market growth?

A. Based on recent German and European regulations and directives, such as RED II, we do not expect overall market growth for any kind of biofuels in Europe and Germany with the next five years. Goals set are quite insufficiently ambitious in order to lead to noticeable market growth—neither for 1st generation biofuels such as bioethanol and biodiesel, nor for 2nd generation biofuels such as the biomethane from straw and residues we produce. Therefore, we go abroad for further expansion. Currently, Asian and U.S. markets offer the most attractive conditions and significant amounts of different kinds of straw as raw material for our biomethane projects. However, we are optimistic that over the next years, the pressure increases to set more ambitious targets for greenhouse gas (GHG) savings in the European transportation sector to be able to achieve the high GHG-saving-targets for 2030. If this happens, it causes market growth, especially for 2nd generation biofuels.

Q: In November last year, you took over a cellulose-based bioethanol plant from DuPont in the USA. What is behind this managerial decision?

A. Despite the USA quitting the *Paris Agreement* on climate protection, they focus on sustainable green mobility at any kind. Biomethane (also named Renewable Natural Gas (RNG)) is a key component in this strategy. Therefore, they offer good conditions and a clearly set-up, long-term stable legal frame for our technology. We intend to use parts of the equipment at the former DuPont plant and to install a biomethane production at the site. So, we

benefit from a ready-to-use infrastructure and reliable supply. The site in Nevada, Iowa is our first step toward the U.S. market. It's our goal to roll-out our innovative RNG production technology over the complete Grain Belt in the U.S. in a second step.

SUSTAINABILITY AND CERTIFICATION

Q: The edible oils you are processing to biodiesel are of German origin. What is your opinion about palm oil as input material for biodiesel plants? Could you give a general estimation regarding the shift from fossil-based fuels to renewables regarding sustainability?

A. In Europe and Germany, biofuels production offers not only a solution for low-emission and sustainable mobility but also safeguards jobs and supports economic wealth in rural areas. Without us using input material from local agricultural production, farmers would be dependent on set-aside premiums to ensure economic efficiency of their businesses. It's vital to keep to a closed loop between local biofuels production and local agriculture to achieve maximum sustainability. As far as the shift from fossil fuels to renewables is concerned, we see both on the market for many more years.

Q: How important is certification for your products, especially regarding a worldwide trade?

A. We mainly produce and trade our products locally. It's important for us to meet the respective (sustainability) certifications in every country.

POLITICS AND POLICY

Q: What is your opinion about the ban of diesel vehicles in some German cities and the public discussions going on? What would be your way out of the dilemma?

A. There's a simple existing solution: the governmental promotion of more sustainable mobility, especially compressed natural gas (CNG) vehicles. In contrast with diesel or gasoline cars, CNG vehicles running on natural gas or biomethane emit quite no nitrogen oxide. Running on biomethane from straw or agricultural waste, they even save more than 90 per cent carbon dioxide. CNG vehicles are available as private cars, buses and trucks. In addition to a short-haul solution by electric vehicles, they offer a long-haul solution. It's needed no more than an incentive effect for people to buy and for car manufacturers to market more CNG cars to get out of the dilemma. The toll exemption for CNG trucks, which came into force in Germany on January 1, 2019 is a good example for such an incentive.

Q: One gets the impression that politicians prioritize electromobility as the one and only way to a sustainable future concept. What is your view on e-mobility vs. biofuels?

A. Yes, it's right. Especially German politicians unilaterally focus on e-mobility as the supposed only solution. Of course, this is nonsense. If we do not want to fail the 2030 climate protection targets, we definitely need to make use of all relevant economically-efficient and sustainable technologies for green mobility. There will be applications for e-mobility (i.e., inner-city, short-haul traffic and railway) and there will be applications for biofuels (i.e., heavy-duty and long-haul transportation). There's absolutely no chance to achieve the targets by betting on just one horse. In addition, it's important to find a way to cut emissions for transportation by air and ship. In these areas, biofuels would be the most sustainable and cost-effective solution.

Q: How much influence do international climate agreements (i.e., Paris Agreement) influence your decisions on a local / regional level?

A. International agreements define very distant goals and provide an overall direction. National and local regulations set the basis for our strategic decisions and business scenarios.

TECHNOLOGY AND PRODUCTS

Q: Could production of bioethanol from straw be a solution for a sustainable alternative to fossil fuels due to the abundance availability of raw material? Is this technology market-ripe?

A. Up to now, there is no industry-scale production in the world. Nevertheless, there are some projects in the pipeline, and R & D is proceeding in this field. I think it would be worthwhile to have another look at a later time.

Q: Verbio is process–owner for producing biomethane from straw. This could be another alternative to fossil fuels. What is the status of this technology?

A. Our first industry-scale production in Schwedt / Oder, Germany, has been in operation since October 2014. The second plant, located near Schwedt / Oder, is being put into operation shortly. In addition to these plants, we have started construction on one plant in the U.S. and one plant in India in 2019. As you see, the technology is market-ripe, and we are rolling it out.

CHALLENGES AND OPPORTUNITIES

Q: What are the major hurdles for a shift from fossil fuels to bio-based fuels?

A. The very basic issue is the cost. Renewables are more expensive, even if production is market-ripe and well-optimized. People need to be willing to pay more money for sustainable solutions or we need to set ambitious climate protection goals and a stable legal frame to force people and the industry to shift to—and invest in—renewables. ■

VERBIO Vereinigte BioEnergie AG is a leading, independent bioenergy enterprise, the only one of which industrially produces biodiesel, bioethanol and biomethane within Europe. The production capacity is about 470,000 tonnes (metric) of biodiesel, 260,000 tonnes (metric) of bioethanol and 700 Gigawatt hours of biomethane per year. The enterprise uses self-invented, power-saving production processes and innovative technologies for the production of its highly efficient fuels. The biofuels of VERBIO reach a carbon dioxide reduction of up to 90 per cent in relation to common gasoline or diesel. VERBIO delivers its products directly to the European mineral oil enterprises, mineral oil trading companies, free gasoline stations, logistic enterprises, and car parks. Furthermore, VERBIO produces high-quality pharmaglycerine and phytosterole for the pharma, cosmetics and food industries, and animal feed and fertilizers for agriculture. Within the group, VERBIO Vereinigte BioEnergie AG acts as management-holding. The operative business is done by the subsidiaries VERBIO Diesel Bitterfeld GmbH, VERBIO Diesel Schwedt GmbH, VERBIO Ethanol Schwedt GmbH & Co. KG, VERBIO Ethanol Zörbig GmbH & Co. KG, VERBIO Pinnow GmbH, VERBIO Agrar GmbH, VERBIO Logistik GmbH and VERBIO Polska Sp. z o.o. The VERBIO-shares (ISIN DE000A0JL9W6 / WKN A0JL9W) are noted in the Prime Standard of the Frankfurt stock exchange since October 2006.

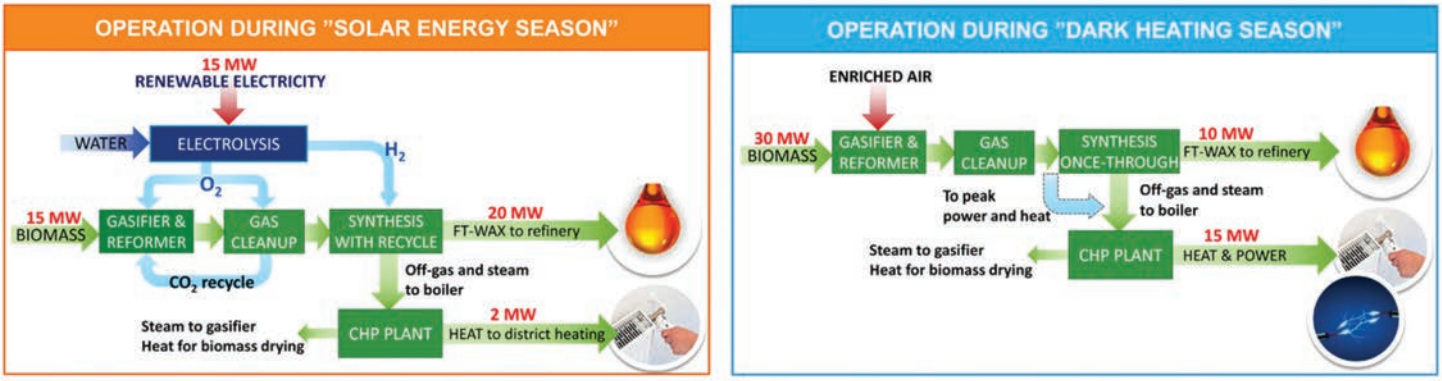
PROJECT PROFILE

FLEXCHX Develops Flexible Combined Production of Power, Heat & Transport Fuels from Renewable Energy Sources

***By Ralfas Lukoševičius**, Director of Innovation, Enerstena Group of Companies*

The FlexCHX project has received funding from the European Union's Horizon 2020 research and innovation Programme under Grant Agreement No. 763919.

VTT's one-megawatt pressurized fixed-bed gasification pilot plant (SXB-Pilot) in Finland.



The key idea of the FLEXCHX project is illustrated in this figure.

FLEXCHX is an EU Horizon 2020 project that develops a flexible and integrated hybrid process combining electrolysis of water with gasification of biomass and catalytic liquefaction. FLEXCHX is a three-year project (2018-2021) with almost 4.5 million in EU funding and a consortium of 10 partners.

The FLEXCHX project is aimed at creating a method for managing the seasonal mismatch between solar energy supply and the demand of heat and power that is highly pronounced, particularly in northern and central Europe. The FLEXCHX concept constitutes a complete rethinking of how combined heat and power should be produced in variable renewable energy-dominated power grids and how the use of excess solar and wind energy can be combined with effective use of biomass residues.

The FLEXCHX process concept

FLEXCHX is a flexible and integrated hybrid process that combines electrolysis of water with gasification of biomass and catalytic liquefaction. This process produces heat, power, and an intermediate energy carrier, Fischer-Tropsch (FT) wax, which can be refined to transportation fuels using existing oil refining equipment. FLEXCHX plants can be integrated with various combined heat and power production systems, both industrial CHPs and communal district heating units.

In the summer, renewable fuels are produced from biomass and hydrogen; the hydrogen is produced from water via

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Bioenergy in Austria

***By Peter Liptay**, Expert, Austrian Biomass Association*

In Austria, bioenergy generates a turnover of Ð2.8 billion. A large part of this amount is accounted for by the allocation of wood chips, logwood, or pellets.

Austrian producers of biomass boilers and stoves provide more than 3,600 domestic jobs.

KEY FACTS

Population: 8.74 million
Country Area: 83,879 km^2
GDP: 420.04 billion USD
Energy Consumption: 27.8 (Mtoe, 2016)
Emissions: 82.3 Mt CO_2
Renewable Energy Share*: 32.6%
Bioenergy Share*: 59%
**As a share of final energy consumption*

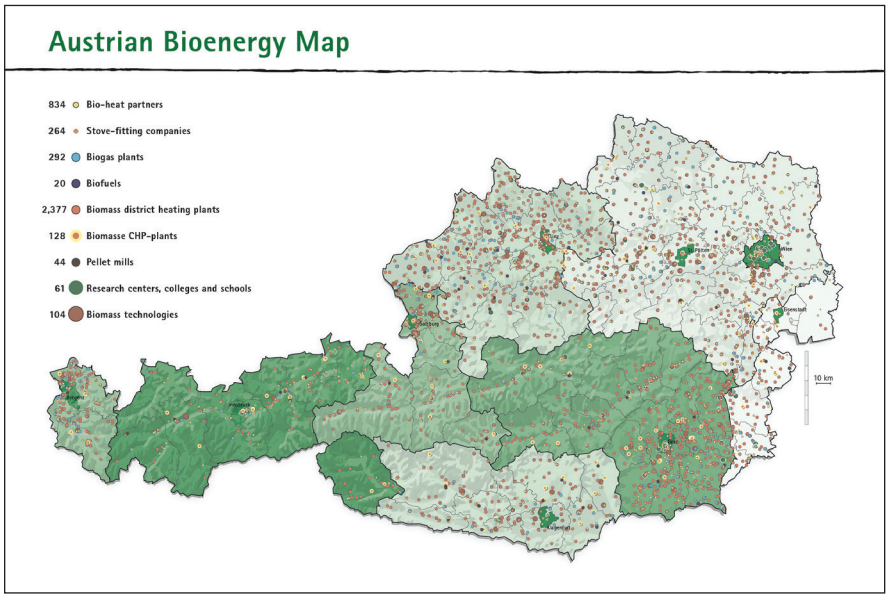
The bioenergy sector has become a mainstay of Austria's energy accommodation. Biomass provides a substantial contribution to Austria's transition toward a sustainable and climate-friendly energy system, creating domestic added value as well as employment and spending power.

Biomass is Austria's most relevant renewable energy source, accounting for 56 per cent of the total amount. In 2017, 44 per cent of the total domestic energy volume was provided by biomass. Between 1990 and 2017, the share of bioenergy for the total energy consumption in Austria has evolved from 9 to 16 per cent even though Austrian energy consumption increased by 37 per cent during that period.

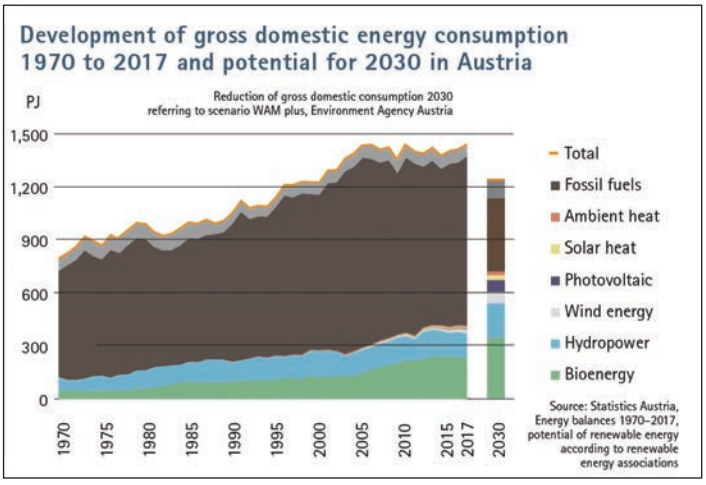
Forests: Main source of raw material

Forests are the most important source of raw material for the biomass sector. Growing stock in domestic forests

Continued on page 26



ABOVE: All over the country, biomass plants, companies, schools, and research institutions are present and adding value in the regions.



RIGHT: The Austrian energy strategy aims to reach a share of between 45 and 50 per cent renewable energies by 2030.

FLEXCHX Develops Flexible Combined Production of Power, Heat & Transport Fuels from Renewable Energy Sources

Continued from page 24

electrolysis that is driven by low-cost excess electricity from the grid.

During the dark, winter season, the plant is operated with just biomass in order to maximize the production of much-needed heat, electricity, and FT wax. Most of the invested plant components are in full use throughout the year—only the electrolysis unit is operated seasonally.

Getting this type of flexible and integrated production concept to the energy production market requires the development of new conversion technologies, which is the focus of the FLEXCHX project. The key enabling technologies include novel innovations. The new pressurized, staged, fixed-bed gasifier followed by catalytic reformer can be operated with a wide range of biomass residues and waste-derived feedstocks. Innovative recycling of carbon dioxide and tail gas from the FT unit will enable flexible operation with and without electrolysis hydrogen. Another key innovation of the project is based on using the compact and highly efficient FT technology, which can be economically realized at the target range of FLEXCHX plants corresponding with 10- to50-megawatt biomass input.

Experimental development and process validation

The main process development activities of FLEXCHX are focused on five key enabling technologies:

1. Gasification;
2. Hot gas filtration;
3. Reforming;
4. Final gas cleaning; and
5. Compact FT synthesis.

The experimental development will be carried out using a one-megawatt, pressurized, fixed-bed, gasification pilot plant (SXB-Pilot) located at VTT's piloting centre in Bioruukki, Finland. At the moment, the existing SXB-Pilot is under modification to allow operation with various ratios of gasification agents (oxygen, air, steam, and carbon dioxide). The gasification and gas cleaning test campaigns start in spring 2019 using various wood residues, straw, and some waste-derived feedstocks. Simultaneously, the FT technology is optimized for the purpose of the project at Ineratec's facilities in Karlsruhe, Germany.

Validation tests for the whole FLEXCHX concept will be carried out in 2020. The goal is that the process will be ready for industrial demonstration in 2021. Potential production sites are assessed together with the industrial partners, especially in Lithuania and Finland, where biomass-based district heating plays an important role. ■

The project (www.flexchx.eu) consortium comprises 10 entities from four different EU countries: three research organizations: VTT (Finland), Lithuanian Energy Institute (Lithuania), and DLR (Germany), five industry participants: Enerstena (Lithuania), Johnson Matthey (UK), Neste Engineering Solutions (Finland), Kauno Energija (Lithuania), and Helen (Finland), and two SMEs: Ineratec (Germany) and Grönmark (Finland). The project is coordinated by VTT, Finland. The consortium of the FLEXCHX project combines chemical engineering, power plant technologies, construction and engineering knowledge, and business understanding.

Bioenergy in Austria

Continued from page 25

has been on the rise throughout the past decades and reached a record high of 1.173 billion solid cubic meters. More than 300,000 people in Austria generate income from forest management. For the forest owners, energy wood is an important byproduct during timber harvesting.

In 2017, forests provided 80 per cent of Austria's biomass volume; the rest came from the agricultural and waste sectors. If its potential is consistently made available, Austria's use of biomass could increase by another 47 per cent by 2030. More than half of this potential for development is associated with the agricultural and waste sector. In the mid-term, bioenergy has the potential to replace oil as the leading energy source in Austria.

Heat market dominant

Traditionally, biomass in Austria is used for heat production. Heating consumes 81 per cent of bioenergy production, followed by biofuel, with a share of 11 per cent, and green electricity from biomass and biogas, with eight per cent. Around 78 per cent of biomass heat is used in single combustion systems; the remaining 22 per cent are used for district heating.

For heating dwellings in Austria, biomass is by far the most popular source of energy, with a share of 40 per cent of the total energy use. Nearly 670,000 Austrian households use primarily wood-burning heating devices to keep their living spaces warm. A distribution grid of around 2,400 biomass district heating stations makes sure large parts of Austria are provided with climate-friendly heating.

Green power, whatever the weather

Besides hydropower and wind energy, biomass provides the biggest share of green electricity in Austria. Wood cogeneration technology is on the rise and allows for high efficiency regarding small-scale power generation. Biomass combined heat and power plants are capable of generating electricity around-the-clock and, thus, make an important contribution to electricity baseload accommodation.

22,250 jobs in Austria

Thanks to the use of bioenergy, approximately 22,250 full-time jobs are secured in Austria. The use of bioenergy generates a total turnover of €2.8 billion. The bigger part—almost €1.5 billion—comes from the provision of combustible material (log-wood, wood chips, wood pellets, or sawmill byproducts).

Austrian enterprises and research institutions ensure that Austrian bioenergy technologies occupy top positions in the domestic and international markets. Replacing fossil heating systems with modern biomass boilers has led to a decrease in carbon emissions by almost 40 per cent since 1990 in the space heating sector.

Energy policy in Austria

According to European Union requirements, Austria is bound to attain a share of 34 per cent of renewable energy in its total energy mix by 2020. The current share amounts to 32.6 per cent. In the new climate and energy strategy, the Austrian government plans to increase the share of renewable energies to between 45 and 50 per cent of gross final energy consumption by 2030. Therefore, the aim is to extend the use of bioenergy, especially for the heat market. ■

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