BIOENERGY

NO 4 2012

BioenergyConnect – Great ideas deserve to grow

THE WORLD BIOENERGY AWARD:

Presentation of the main nominees

Compiling global statistics on biomass for energy for a "Global Bioenergy Outlook" - How do we get on to the same page?

SWISS COMBI - the innovative engineering company specialized in the development, construction and realization of **industrial dryers for biomass**






SWISS COMBI *Belt Dryer*

ecoDry

Condenser

SWISS COMBI - W. Kunz dryTec AG
CH-5606 Dintikon (Switzerland)
Phone +41 56 616 60 30
info@swisscombi.ch www.swisscombi.ch

At COP17 in Durban, the WBA asked the presidency of the COP to encourage interested countries to develop this initiative.

By The World Bioenergy Association

LETS GET SERIOUS.

The "Durban Initiative – Concerned countries moving ahead" 2°C – 2t CO_2/capita by 2040

THERE IS AN URGENT NEED for immediate action, on a global scale, for all nations to reduce CO_2 emissions in order to achieve the 2°C target. However, a process that is reliant on unanimous legally binding decisions is simply too slow. An additional initiative is needed, based on concerned countries, companies and individuals, pledging to emit less than 2t CO_2/capita in 2040. The president of the COP17 has been asked to encourage interested countries to develop this initiative.

Pursuant to the ultimate objective of the Convention: a "stabilization of greenhous gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system", and in accordance with the Cancun decision to keep global warming below 2°C, by 2040 there should be no country on the globe that emits more than 2 t CO_2/capita and year. This conclusion is strongly attenuated by academic opinion from the scientific community and, further, is based on projections for world population growth to 2050 and the principle of a just allocation of future emission quotas.

INDUSTRIALIZED COUNTRIES with around 8t CO_2 emissions/capita and year at present should begin by reducing their emissions by 0.2t/capita and year, and countries with higher emissions should aim for a more rapid reduction. Countries with 2t/capita emissions or less must ensure that the growing energy demand for continued economic development is supplied by renewable energies and not by fossil fuels. A green climate fund should compensate these countries by financing capacity building and technology transfer to enable them to achieve this.

In reality, it cannot be assumed that an unanimous legal binding decision for all parties can be reached within the UNFCCC within a short period of time. The principle of unanimity means that the slowest partner defines the speed of the global process on climate protection. Therefore a new, supplementary approach is needed.

THIS IS A SIMPLE DESCRIPTION of the concept of the "Durban initiative – concerned countries moving ahead". The concept is based on the principles of responsibility, justice and free will, open to all countries; it should supplement, and not replace, the on going process within the UNFCCC.

More details concerning the motivation for countries to join the club of concernend countries, the advantages, and the possbile support of this initiative by the civil society can be found on www.worldbioenergy.org.

Bioenergy is published by the World Bioenergy Association

Torsgatan 12, SE 111 23 Stockholm, Sweden
Tel: +46 8 441 70 80, Fax: +46 8 441 70 89
Web: www.worldbioenergy.org
E-mail: info@worldbioenergy.org
Publisher: Kent Nyström
Editors: Karin Haara, Andrew Potter, Sebastian Boscher
Sales: Andrew Potter
Production: Malin Fredriksson
Print: Ark-Tryckaren, Jönköping, Sweden
Cover photo: Carmen Martinez Banús, iStockphoto

CONTENTS

Screening & Processing • Size Reduction • Material Handling
Storage & Reclaim • Pneumatics • Vibratory Feeders


Tube Feeder


Chip Sizer

Jeffrey Rader is a global leader in material handling and size reduction equipment. You can find Jeffrey Rader equipment and systems installed throughout the world, providing reliable operation in the pulp and paper, coal, aggregate, biomass, petro-chemical, forest products, mining and many other industries.

SWEDEN
Domnarvsgatan 11
163 53 Spånga, Stockholm, Sweden
+46 8 56 47 57 47 • swedensales@jeffreyrader.com

USA
398 Willis Road • Woodruff, SC 29388, USA
864.476.7523
Toll Free (North America): 800.615.9296

CANADA - Montreal, Quebec
2350 Place Trans-Canadienne
Dorval, Quebec H9P 2X5, Canada
514.822.2660

CANADA - Vancouver, BC
Unit 2, 62 Fawcett Road
Coquitlam, BC V3K 6V5, Canada
604.299.0241

www.jeffreyrader.com

Now with offices in Beijing, China and Moscow, Russia.

TIME FOR A NEW BIRTHDAY PARTY

– the WBA celebrates 4 years of intensive struggle

Reception on 29th May at World Bioenergy 2012, Elmia, Jönköping, Sweden.
All bioenergy friends are welcome!

All is relative due to Einstein. 4 years can, depending on the circumstances, be a short or long time. 4 years ago, after consulting my bioenergy network, I contacted some enthusiastic bioenergy experts to form the WBA interim board. That now seems like yesterday. But when I recall and reflect on all that has happened during the WBA's lifetime, it feels like the birth of our organisation happened an age ago.

Right from the outset, from the very first board meeting, the association has made and witnessed some impressive developments. Today the WBA is the global representative of bioenergy in the International Renewable Energy Alliance (REN Alliance) and is an official observer to the UN process for combatting climate change. In recognition of our past work we continue to be approached by leading authorities. Our collaboration with IEA Bioenergy is deepening through collaboration on conferences and discussions on related issues. Furthermore, the WBA has given direct input to the UN Secretary General Ban Ki-moon High Level Panel on Sustainability and we are supporting the launch of 2012 as the year of "sustainable energy for all".

WBA's mission

The purpose of the WBA is to promote the increasing utilisation of bioenergy globally in an efficient, sustainable, economically sound and environmentally friendly way.

The WBA project on building a sustainability label is well on its way now. The scheme is based on the scientific reports produced by the Swedish University of Agricultural Sciences and was launched in 2010 by the WBA at COP 16 as the "Certification Criteria for Sustainable Biomass for Energy". Now the document "Sustainable Biomass for Energy – WBA Verification Scheme" is finished and is currently in the testing phase. The next step is to offer the scheme and sustainability label to producers and users of biomass for energy.

We are happy to announce that the business and research web based platform, BioenergyConnect, is imminently awaiting its launch. It will function as a global marketplace for companies, researchers and any individual searching for information and/or solutions within the bioenergy sphere.

The WBA is actively encouraging the creation of new national bioenergy organisations around the world, whom we expect will play important roles as umbrella organisations in their respective countries similar to the way that the WBA does on a global level. Initiatives and discussions have commenced to build bioenergy associations in many countries and India is on its way with the legal framework having been cleared. The African Bioenergy Association was launched in 2011.

WBA and COP 17

At the COP 17 meeting in Durban, South Africa, the WBA, as an official observer organization to the COP processes, was able to launch the "Durban Initiative - Concerned countries moving ahead" to accelerate the global climate objective "not to exceed the 2 degree target", and determine how this could be done. This initiative was distributed to governments, press, NGOs and as a letter to the President of the COP 17, Ms Maite Nkoana Mashabane, Minister of International Relations and Cooperation, South Africa.

WBA, REN Alliance and IRENA

Our collaboration with the REN Alliance has further led to a new beginning of the relationship with the intergovernmental organisation, the International Renewable Energy Agency (IRENA). The REN Alliance represents the industry and IRENA the political sphere. Together, naturally, we form a strong driving force promoting the increased utilisation of renewable energy.

WBA's members

Today the WBA reaches about 8,000 organisations and enterprises, a number we hope to see grow substantially in the near future. In addition to adding individual organisations and associations to our ranks, the WBA also hopes to gain more transnational members, similar to its early supporter and current member AEBIOM, the European Bioenergy Association, which indirectly brings approximately 4,000 members to the WBA network.

WBA's future

As we continue to intensify our work in the coming years, we are confident that more organisations and enterprises will come to see the benefits of the WBA network and its potential to affect policy and facilitate commercial opportunities for its members.

We look forward to what we expect will be a successful 2012, filled with more exciting developments for the WBA in terms of expanding and strengthening our network, as well as raising our profile on the international stage and getting the financing of the WBA in line.

Personally, it has been very exciting to serve as the WBA President for 4 years. But now it is time to make way for new ideas, so at the Steering Committee meeting in Jönköping at World Bioenergy 2012, I will officially step down as the president. I wish my successor and the WBA all the best in the future and I will continue to serve the association, but in a more modest way.

So, I urge all bioenergy friends to join the WBA, and keep on with your efforts!

Yours sincerely,

Kent Nyström
President,
World Bioenergy
Association

The purpose of this presentation is to give voice to prominent advocates from the Bioenergy world. A questionnaire was sent to a group of bioenergy experts in our own ranks and here we illustrate some summaries of their findings. Their full answers will be available on the WBA member pages.

By Karin Haara, World Bioenergy Association

Compiling global statistics on biomass for energy for a "Global Bioenergy Outlook" - How do we get on to the same page?

THERE IS CURRENTLY an inherent lack of transparency and clarity over global statistics for biomass, biofuels and bioenergy. There is an urgent need to improve exisitng methods and implement new measures to track bioenergy development. There are many ongoing initiatives to fill the present gap, as for example, the activities undertaken by the International Renewable Energy Agency (IRENA), the International Energy Agency (IEA), the OECD-FAO Agricultural Outlook, and REN21.

The WBA is delivering data and reviewing the Global Status Report on Renewables (GSR) in collaboration with REN21. Recently we have started a collaboration with the International Renewable Energy Agency (IRENA) to tackle the present issue. However, this is insufficient, as one of the WBA's main objectives is to become the primary source of data on all biomass, biofuels and bioenergy availability world wide. We need to be able to compile data that is located from a wide range of sources. Moreover, we need to engage in consistent dialogue with all areas in the industry, to ensure that we collect the right data, so that businesses and investors can better formulate their own growth strategies. The next step for the WBA is to identify what exactly the scope of the data should be, find the key people from different geographical regions and create the collaborations that can finance our aims.

The questionnaire

When we started up the WBA in 2008 we commissioned the Swedish University of Agricultural Sciences to collate the results from research on global bioenergy potentials. One of the fruits of the study was the diagram showing where (and to what extent) unexploited potentials are. This was the primary basis for our questions.

5 QUESTIONS TO BE ANSWERED:

1. Where and how much unexploited biomass potential do you find in your nation/region/continent?
2. What are the conditions for utilising the potential?
3. Who are the main players?
4. Are there any indirect influences?
5. What is your opinion of bioenergy development?

JENNIPHER HANDOONDO, WBA BOARD MEMBER, ZAMBIA

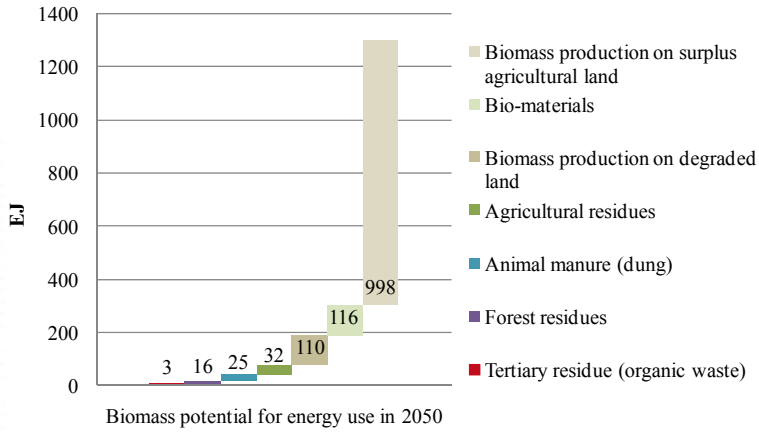
– The potential for Bioenergy in Africa and Zambia is very high. Zambia has a lot of agricultural residues with the increase in cotton and soya production and livestock, the poultry industry has grown, the sawmills and rice mills are also in abundance. The new government in Zambia is interested in developing bioenergy.

LAERCIO COUTO, WBA BOARD MEMBER, BRAZIL

– In Brazil we have 200 million hectares of pastures that can be used to produce planted eucalyptus and other species which can produce biomass, an average of 30 cubic meters per hectare per year. We also have agricultural residues, the residues of the management plans of the Amazon concessions, animal manure of the confinements we have here, forest residues of the pulp and paper plants and municipal solid wastes. I am not quantifying those as biomass.

– The barriers at the moment are logistical (we need railroads and better ports). Prices of fossil fuels such as natural gas, taxes, environmental pressure by NGOs, etc.

– The domestic market in Brazil is growing very rapidly with regards to the use of biomass for electricity generation, for steam production, for tiles production, for charcoal production and to produce pellets for the domestic and international markets.



Contribution of each biomass resource category to the global potential of biomass for energy use in 2050 (EJ)
(Source: Hoogwijk et al, 2003). From the report "Global Potential of Sustainable Biomass for Energy" (Report 013, ISSN 1654-9406, Swedish University of Agricultural Sciences).
Note: The biomass resource categories are distinguished to asses the theoretically available potential of biomass for energy use.

HEINZ KOPETZ, WBA BOARD MEMBER, EUROPE

It can be estimated based on European statistics that at present in all Europe (including Russia and Ukraine etc) around 10 EJ of bioenergy are not used. I see a growing importance of biomass in the heating sector – pellets, chips etc., a slow down in new electricity units, an increasing demand for imported biomass, a rather slow change in land use towards more forests.

SRIBAS BHATTACHARYA, WBA BOARD MEMBER, INDIA

– Domestic use of biomass is most promising since India lacks fossil fuels. Feed-in tariffs exist in most states in India. India lacks surplus agricultural land. The following resources are available:
Biomass production potential on degraded land: 60 million hectares
Agricultural residues: about 250 million tones of surplus agicultural residue/year
Animal manure: mostly used up as dung cake for fuel and fertiliser and some in biogas plants
Forest residue: 160-250 million ton/year
Tertiary residue (organic waste): recovery insignificant

BEN MUOK, WBA BOARD MEMBER, KENYA

– Biomass is attractive because there is such a low proportion of the population (5%) that have access to electricity. 90 % of the people are using "traditional biomass" as modern bioenergy solutions are still not availible for most of the people.
– To be able to use bioenergy in Africa sound goverment policies are of the utmost importance. Most of the investments from the government are being done in gas and electricity.
– What Africa needs is effective financing systems. Furthermore, the biomass technology is not recognised and farmers that would like to produce crops are not able to get loans and, therefore, not able to get the technology needed.
The average income is low and there is also need for human development, better education and dissemination of information. Locals cannot afford effective and clean technologies, and consequently the development in the country is slow. The goverment needs to create a good environment for growth, and a market for farmers and companies.

ANDREW LANG, WBA BOARD MEMBER, OCEANIA

– Almost all biomass in Australia is unexploited, with most of this as agricultural and plantation forestry biomass and also municipal wastes. Totals may be in the order of 50 million tonnes per year.
– Australia's present available biomass is estimated to be able to supply 30% of current electricity demand and a significant fraction of both heat energy and transport fuels (10-30%).
– NZ has some utilization of biomass for energy in the forestry and timber processing sector and due to policy, as well as to organized bioenergy groups providing input to long term policy targets. There is obvious scope for improving utilization of biomass from forestry operations and of municipal wastes. South Oceania (as the Pacific countries) has almost no utilization and availability, is variable and is from agricultural and forestry wastes and urban wastes.
– Within the other South Pacific countries (Fiji, Papua New Guinea, Tonga etc,), there is some growing awareness and from the point of national resource security a strong need for, indigenous sources of energy that use approriate technology to provide cooking, transport fuels and lighting, as well as on-demand electricity.

The World Bioenergy Award – for an individual who has made a difference

The six final candidates for the World Bioenergy Award 2012 have now been chosen. This is the second time that the World Bioenergy Award is presented. We asked the nominees some questions to get their personal views regarding bioenergy. Here are their answers:

The six final candidates to the World Bioenergy Award 2012 are now chosen. One of them will be announced as the winner on May 29 at the opening session of World Bioenergy 2012. This is the second time that the World Bioenergy Award is presented.

The aim of the World Bioenergy Award is to recognize an individual who has made a difference: a business leader, politician or researcher who in a crucial way has furthered the development of the bioenergy sector.

The nominees hail from a broad range of professional areas and selecting the winner was not an easy task for the judges. The award panel consisted of the board members of the World Bioenergy Association and the product manager of World Bioenergy 2012.

MR AL COSTA, ALKOL, SPAIN

What has been the most exciting issue working with biomass for your personal life and professional experience? Why did you start working with biomass for energy?

I've always been interested in the green energy ever since high school, when I remember developing a rudimentary biodigestor for a science fair project. After that I worked in other industries and that gave me a great perspective on the enormous challenges and opportunities the bioenergy sector has to offer. So I added my old passion for green energy with my bachelor's degree in biology to look for bio-based solutions that could change how we consume energy and just about any product today.

According to your work and experience how do you see the future for the bioenergy sector?

New markets for new products. Just like the oil industry during its inception hardly knew what to do with that black liquid, today we are at the infancy on finding uses and markets for our products. This is changing fast, as new and exciting solutions are being developed from the same feedstocks that once were used to generate only one or two products. So, we are moving from offering just products, to true solutions for real world problems.

Which areas relating to bioenergy do you think should be developed in short and long terms? What do you see as the next big step for development of the field?

I've claimed many and many times that we need to focus our efforts in distribution. Regardless on how inexpensive, green, and politically correct our product is, that means nothing if it is not readily available to the public. We need to create market awareness and distribution spots and make sure their shelves are always full. We need to empower our customers for them to truly understand what we offer and thus to make an informed decision for all their energy and environmental choices.

Mr Al Costa.

"We live in an increasingly interconnected planet, and for a country not take advantage of the experience and technology of others simply makes no sense."

How has the exchange of ideas with international partners helped your work or career?

With Brazilian as well as with Spain, I've seen how each country has developed green technologies which can help each other (and many others) so much and the opportunities they create not only for profits, but also to make a difference for the world. We live in an increasingly interconnected planet, and for a country not take advantage of the experience and technology of others simply makes no sense.

Mr Harry Stokes has seen that a good cooking stove can change the lives of families in Africa.

"Since the global environment links us all and since half the world's population living in energy poverty will jeopardize everybody, even those who have all the energy they need, it is within everybody's interest to promote the use of biofuels in the Developing World, not only for export but also for local use."

Would you like to add something?
I'd like to thank the World Bioenergy Association and SVEBIO for organizing this event and for all their hard work to promote bioenergy in general to the world. We in this industry face enormous challenges and opportunities and only through unity will we be able to tackle them into something nice not only for us, but also for our children.

HARRY STOKES, PROJECT GAIA INC. AND GAIA ASSOCIATION, USA

What has been the most exciting issue working with biomass for your personal life and professional experience? Why did you start working with biomass for energy?
I grew up in a household with a father who worked in energy and who spoke about energy and taught his children the chemistry, technologies and issues relating to the global demand for energy.

I was trained as a forester. I naturally developed an interest in energy from biomass and later in biofuels. My Masters thesis in 1974 explored the feasibility of managing former paper company forests for power generation.

My father obtained his early experience in energy and alternative fuels in post-World-War-II Europe as a young engineer working for US industry in the European Recovery Program (Marshall Plan). Thirty years later he applied the European know-how he had learned in the 1940s to the development of alternative fuels for the US in the 70s, after the first oil shock of 1973. The alternative fuels approach involves alcohol fuels—ethanol and methanol. From the vice president of a major oil company in the 1970s to an energy "elder statesman" in the 1990s, my father moved his focus largely from fossil fuels to alternatives and renewables. This included direct combustion, solar and the alcohols. His last project—Project Gaia—was developed with other long time energy practitioners from the US, Europe, Latin America and SE Asia. The concept was to introduce alcohol fuels to the Developing World, encourage local production, preferably on a distributed basis, and encourage the use of alcohol fuel for household use and bottom-up markets, displacing imported petroleum fuels and wood fuels. I "inherited" this project in 2003, and have tried to move it forward since that time, with the help of many, including a bright, able, young staff, most of whom are African.

The most exciting issue for me has been to come to understand the extent to which alcohol fuels have been a concerted strategy for fuel production for 175 years, and that these strategies may have finally reached their time. The Alternative Fuels programs in the US of the 70s fell on hard times with the return of cheap oil and indifferent policy making, but took firm root in Brazil. Today, alcohol fuels are no longer likely to fade, but rather to grow stronger quickly, especially in the Developing World. They will contribute in this decade to the U.N. target of "securing access to sustainable energy for all."

According to your work and experience how do you see the future for the bioenergy sector?
With improved technologies, bioenergy should continue to expand rapidly on all fronts. But it will require continued leadership. Once governments really reckon with climate change and are finally willing to provide price incentives to decarbonize the economy, the move to biofuels should quicken. If they also reckon with climate forcers like black carbon, this will happen even more quickly. Alcohol fuels are the solution. They represent the lowest cost and most accessible alternative available today. Perhaps most importantly, alcohol fuels produced from a variety of raw materials and used directly and indirectly (such as in bio diesel) represent the single most realistic option to breaking the oil monopoly in the transportation sector.

Which areas relating to bioenergy do you think should be developed in short and long terms? What do you see as the next big step for development of the field?
At Project Gaia we are promoting small and very small scale ethanol and methanol plants and hope to see more distributed energy production. There is more and more interest in bio-methanol, which will be produced in smaller plants. It is of course the case that most methanol today is made from natural gas and some is made from coal. But methanol offers a bridge from fossil fuels to biofuels. This has been demonstrated in The Netherlands and Sweden. And atmospheric carbon recycling is being demonstrated in Iceland as predicted by the Nobel laureate George Olah. If we start using methanol as a fuel, this will lead to bio-methanol and a realistic roadmap for reusing our available carbon instead of pouring more than 3 kg of "new" CO_2 into the atmosphere for every Litre of gasoline and diesel that we burn.

Small plants promote energy access—which is a big topic this year with United Nations Secretary-General Ban Ki-moon's priority of "Sustainable Energy for All." How do we achieve energy access? Not just by thinking big, but also by thinking small.

But in terms of big—at Project Gaia we also believe that ethanol should be delivered in global markets from large producers not just for auto fuel, but also for stove fuel.

Kerosene is retreating worldwide from cooking fuel markets. If we can ship ethanol to Africa or India for fuel blending, why can we not also ship ethanol for women to cook with? Tests have shown over and over again how clean the indoor air is when ethanol stoves are put in the place of wood, charcoal and kerosene stoves. Ethanol is a safe fuel for cooking, as our safety record in Africa

shows. If fuel wood, charcoal and kerosene are selling in many markets for $1.00 per day for a day's cooking, one can see that the economics are already about right to deliver ethanol more cheaply than traditional cooking fuels. Not only is there a social and humanitarian opportunity here, but also a business opportunity.

The refugee camps in the Horn of Africa that host Somali refugees displaced by years of war, climate events and famine now have a total population exceeding 800,000. If Sudan and Chad are included this swells to 5 million people. The UNHCR needs a cooking fuel to supply to the people in its camps. Can ethanol be supplied cheaper than kerosene? To me, this is the great humanitarian challenge presented today to the global ethanol industry, particularly the U.S. and Brazilian producers.

Can the producers help us to set up a supply chain that will deliver ethanol to these energy hotspots efficiently, so that donors can purchase ethanol fuel as cheaply as possible and deliver it to where cooking energy is so desperately needed? If just 5 cents can be saved on the cost of a day's worth of cooking, this is an annual saving to donors of $13 million, for just the Ethiopian and Kenyan camps alone. And the refugees are provided with a cleaner, safer fuel.

The challenge to the industry is to work with U.N. agencies and others, like the new Global Alliance for Clean Cookstoves, to develop a supply chain that can work for the cooking fuel market—and let's begin with the humanitarian market. We at Project Gaia have been with Somali people on a barren hilltop in a land where there is no biomass to gather for cooking. They have food rations but no fuel to cook it with. The feeling of loneliness and desperation is overwhelming. Imagine that you cannot cook because you have no fuel. This is becoming more and more commonplace around the world.

For methanol, the "other alcohol," the challenge is a bit different. We must encourage methanol producers to think of methanol as a fuel, not simply as a chemical feedstock. Methanol is the ultimate hydrogen fuel, with the highest hydrogen-to-carbon ratio chemically possible while at the same time remaining a liquid fuel that is easy to use. If handled safely, the cleanliness of its combustion makes it the perfect cooking fuel. It is also marvellous for power generation, from small fuel cells for laptops to large turbines to power a city. But the global methanol industry will have to take an interest in energy markets and expand beyond traditional markets.

Methanol can help ethanol by boosting the supply of alcohol fuel and assuring that fuel supply interruptions are not encountered. This is possible because ethanol and methanol behave as one and mix in any proportion. If we desire to build an ethanol fuel market, methanol as a backup can assure fuel supply security.

The methanol industry is again today eying auto fuel blending, but how about stoves? According to the World Bank Global Gas Flaring Reduction program, some 5.3 trillion cubic feet of gas is flared or vented every year. Converting this gas to methanol in small scale plants would not only make a significant impact on the global emission of greenhouse gases and black carbon, it would also serve almost two-thirds of those who do not have access to modern and clean energy forms for cooking today. The provision of this alcohol fuel would not promote Land Use Change as has been associated with the large-scale production of bio fuels.

How has the exchange of ideas with international partners helped your work or career?

Two years ago I was honoured to be considered for the World Bioenergy Award, which was won by Laércio Couto, in part for his achievement in developing an international market for woodchips and pellets for heating and power generation. His example was very inspiring to me and made me realize with much more clarity the need for Project Gaia to focus more on developing the international alcohol fuels market for cooking and other small scale uses—uses that get overlooked even as automobiles are served. When one is brought together with others who are passionate about biofuels and have made sacrifices to achieve their vision, one is greatly energized. Laércio is also a forester, so perhaps foresters can change the world.

Would you like to add something?

The great opportunity that many less industrialized and less wealthy nations have to source the energy they need is biofuels. For many countries, cooking represents the primary energy need. To meet this need, biofuels supply must be largely shifted from the forest to the farm. The farm produces energy crops once, twice or thrice each year and poorer economies do not have time to wait 15 years for harvest or even 5 years for coppice rotation.

Since the global environment links us all and since half the world's population living in energy poverty will jeopardize everybody, even those who have all the energy they need, it is within everybody's interest to promote the use of biofuels in the Developing World, not only for export but also for local use. If we learn how to trade ethanol into the Developing World for stove fuel and other basic fuel needs, this will help the Developing World to produce more ethanol for themselves. As they become inured to alcohol's benefits as a fuel, the "other alcohol" will follow. Today, there are almost 200 Billion Litres of ethanol and methanol produced annually. If we can encourage just 5% of that to go into the cooking fuel market, we will be off to a good start—27 million stoves operating on alcohol fuel! By 2020 we could reach 100 Million clean-fuelled stoves, the goal set by the Global Alliance for Clean Cookstoves.

Photo: Örjan Karlsson

The first prize winner in 2010 was Professor Laércio Couto from Brazil. He was honoured for his applied research into environmentally appropriate and efficient methods of cultivating eucalyptus, which could replace huge amounts of coal and other fossil fuels.

MR ADITYA HANDA, ABELLON GROUP, INDIA

What has been the most exciting issue working with biomass for your personal life and professional experience? Why did you start working with biomass for energy?

The most exciting thing about Bioenergy, especially in the context of developing nations, is the multitude of levels at which it can bring about transformation. Bioenergy

"Bioenergy has the capability to provide access to affordable clean energy solutions up to the last mile, protect and nurture the environment, integrate the bottom most layer of rural society into the country's growth story by creating incomes and opportunities, and make nations energy self reliant."

has the capability to provide access to affordable clean energy solutions up to the last mile, protect and nurture the environment, integrate the bottom most layer of rural society into the country's growth story by creating incomes and opportunities, and make nations energy self reliant.

Personally and professionally, it is immensely gratifying for me to know that team Abellon is helping to bring about this transformation.

As a business group, we have always been driven by the desire to create large scale, game changing, economic and social impacts through our entrepreneurial ventures. In the energy space, we explored all available options before zeroing in on Bioenergy as the segment that has the potential to be just such a game changer for countries such as India and Ghana.

According to your work and experience how do you see the future for the bioenergy sector?

Biomass power as a clean and green energy solution, has the highest energy generation potential, is the most capital efficient, offers much larger employment potential, and maximum carbon emission reduction potential.

To quote some statistics, India alone has the potential to generate 64,680 MW bio mass power. Of this, 19,680MW can be generated from use of agri-residue - currently an unutilized resource that gets burnt in the fields. The balance can be through energy crop cultivation, which can help rejuvenate about 20% of India's wasteland, currently estimated at about 65.8 Mn. Ha. This process would also enhance carbon sequestration capacity and forest cover.

In the process, the country can displace 19.48 Million MT of coal, and reduce emissions of 26.49 Million MT CO_2 due to fossil fuel consumption.

Biomass power also has the capacity to generate 4 million green jobs in India by 2030.

Given this size and scale of potential, supported by a conducive policy for the environment, bioenergy can be well positioned to become one of the pivotal and most viable energy sources of the future.

Which areas relating to bioenergy do you think should be developed in the short and long terms? What do you see as the next big step for the development of the field?

In the context of emerging nations such as

Mr Aditya Handa.

India, the short term focus should be on aggregation and segregation of different forms of waste available, and utilizing it for solid biofuels manufacturing/biopower generation as a replacement to highly polluting fossil fuels such as coal and lignite.

Over the long term, the focus should be on development of large scale captive sources of biomass such as organized energy plantation on wasteland, technology/R&D interventions leading to higher end, and value added products such as 2nd generation liquid biofuels, torrefied pellets, biorefinery products and more. The next big step for development in this field, especially in India, would definitely be the introduction of a bioenergy led vision for economic, environmental and social development, and resulting policies that can help the sector blossom and grow into achieving its true potential.

How has the exchange of ideas with international partners helped your work or career?

While the bioenergy sector is at a fledgling stage in India, globally, especially in Europe and North America, it is an established industry. Thus, our international partners, be they business and marketing associates, technology suppliers, or customers, have been a source of very valuable knowledge and insights for us, right since the day we first decided to enter this segment.

One of the early lessons we picked up through visits to facilities across North America and Europe, was in identifying quality biomass availability at the right time and cost, as perhaps the most critical challenge to success. We noticed how the most successful, big, bioenergy companies had access to guaranteed and often captive sources of biomass, at reasonable cost. This led to the formulation of our decentralized biomass collection model, through which we source agricultural biomass from within a 50km radius of our solid biofuels manufacturing/power generation facilities. Today, we are well entrenched within over 100 villages of the state of Gujarat, India, where we have 3 manufacturing facilities for solid biofuels, and an upcoming project for biomass power generation.

In a bid to further enhance the sustainability of our biomass sourcing initiative, we have also successfully set up a model 120 acre energy plantation project in the state, with more such projects in the pipeline, which would effectively utilize wasteland, and provide income and employment to local rural communities.

Would you like to add something?

For those of us working in the global bioenergy community, this source of clean energy generation is undoubtedly one that can bring about a radical and lasting transformation in the world – economically, environmentally and socially. However, the sector can benefit tremendously from a more universal recognition of its potential and capabilities to address global challenges.

Forums such as the World Bioenergy Council play a significant role in generating this recognition and giving a voice to the community. On behalf of Team Abellon, I wish to thank you for the effort you are putting in on this front through platforms such as the global bioenergy conference and award.

DR DILIP R RANADE, AGHARKAR RESEARCH INSTITUTE, INDIA

Exciting issues

After completing my post-graduate studies, in 1975, I received a fellowship at Agharkar Research Institute (ARI, then MACS Research institute), Pune, India.

The Government of India, realizing the importance of bioenergy, was then providing subsidies to farmers to construct biogas plants to promote the use of biogas as a cooking fuel. This gave impetus to research and development activities in the renewable and sustainable energy sector.

I realized that microbiological research on biogas production was totally neglected at that time. Since I did my post-graduation in Microbiology I got interested in microbiological aspects of biogas production with special reference to methane producing bacteria/ methanogens.

Methanogens are obligately anaerobic and hence require specialized techniques and facilities for their studies. None of the Indian research laboratories had the required facilities to study anaerobic bacteria such as methanogens. During my PhD research through literature and discussions, I developed required facilities at our Institute for studying 'Methanogens'. Subsequently, I did research on 'methanogens in cattle waste slurry from biogas plant' as a topic for my Ph D research. I could isolate and identify five methanogens to the species level. In 1980, based on my research on methanogens I was awarded the PhD Degree in Microbiology by the University of Pune, India. I also published my research findings in one of the reputed scientific journals in India (Ranade DR et al, 1980. Methanogenic organisms from fermenting slurry of the gobar gas plant. Current Science, 49: 395-397.) This is the first paper on methanogens from Asia.

The isolation and identification of methanogens present in cattle waste based biogas plant was the most exciting issue while working with bioenergy. Subsequently I received a special research scholarship from the Government of France for post-doctoral research on methanogens and methanogenesis in France. This proved as the turning point for my career. I learnt various laboratory techniques for research and development in the area of anaerobic bacteria and biomethanation processes. On my return I continued with my interest in R&D on bioenergy, particularly on biogas production from biomass. Then I applied many of the techniques that I learnt during my post-doctoral research.

"I envisage a very large number of biogas plants as well as biomass gasifiers coming up in India and other Asian, African and Latin American countries owing to rich agricultural produce."

In 1985 UNESCO, on the basis of the biodata and contribution in the area of Bioenergy, awarded the "UNESCO-ROSTSCA YOUNG SCIENTIST AWARD for contribution in New and Renewable Energy Sources" to me. This was the best personal achievement in my R&D career.

With the help of my colleagues I developed through laboratory research an optimized process for biogas production from de-oiled castor (Ricinus ricini) cake. This is the biomass left over after extraction of non-edible oil from castor (Ricinus ricini) and is normally burnt directly to obtain energy at the cost of its organic manure value. We thought of digesting this biomass anaerobically to produce biogas. Due to the content of toxic alkaloids it was a challenge to use de-oiled castor (Ricinus ricini) cake as a substrate for biogas production. Through lab research we succeeded in developing an efficient process which we termed as "3EBT (Efficient, Ecof-

Mr Ranade has developed systems to generate biogas from a variety of biomass sources.

riendly, Economical BioTechnology) Process for production of biogas from de-oiled castor cake". In our process we could produce around 350 L biogas per kg biomass per day having ca. 75% (v/v) methane.

Based on lab research data we took a trial at 1000 L capacity biogas plant. Then we transferred this know-how to an industry M/s Ashsih Cans and Containers Private Limited, Talegoan, Pune, India. We advised the industry on designing and developing a field-scale biogas unit to produce 230 CuM biogas per day. The biogas, so produced, was used by the Company to run the industrial burner being used for LDPE-can moulding. The Company could replace nearly 200 L diesel per day, which it was using for the burner. The conversion of lab research into a full-scale biogas plant at the industry and the savings in commercial fuel due to the use of biogas was an exciting professional achievement. Similar success was achieved with de-oiled cake of Pongamia indica, food waste/ kitchen waste, antibiotic mycelial waste, etc.

In addition to this I was involved as the principal investigator in many industrial projects related to anaerobic treatment and biogas technology. I have given consultancy to many industries as well as advice on the setting up of laboratories for biogas research.

Exchange with Scientists from other countries

I have successfully completed two international projects (funded by Swedish International Development Agency through Asian Institute of Technology, Thailand). This gave me the opportunity to have exchange of ideas with scientists from Sweden, Germany, France and many Asian countries. The contacts established are yet proving beneficial for our research on Bioenergy.

In India I completed over twenty projects supported by Government agencies of India and corporate entities. I have also conducted many training courses/workshops/seminars on the subject. To date I have 65 research publications to my credit. I have co-authored two laboratory manuals and chapters in internationally referred books. Guided eleven PhD Students and another four students are presently working with me.

Future for the bioenergy sector

The bioenergy sector is predominantly referred to utilization of biomass. This biomass is used to generate energy through gasification or to generate biogas. The fermentation processes to produce liquid fuel in the form of bio-alcohol, bio-butanol and gaseous fuel in the form of bio-hydrogen are now being developed and tried in industries.

I envisage a very large number of biogas plants as well as biomass gasifiers coming up in India and other Asian, African and Latin American countries owing to rich agricultural produce. Use of biogas technology to produce gaseous fuel from all available biomass and organic waste has become very important for the developing countries. The process has the dual benefit of producing biofuel and generating organically rich manure for farming. High-rate anaerobic processes will be in demand. Up-gradation of biogas by removing carbon dioxide to make it comparable to CNG to replace petrol and diesel in the automobiles is the most sought after technology in India.

Short- and long-term areas to be developed

In the short-term a large number of processes would be developed to utilize a wide variety of biomass to generate biogas.

In the long-term, these processes would be up-scaled to benefit the end-users, viz. rural areas, industries, and domestic-fuel requirements.

Future research

To develop transgenic methanogens having the ability to produce methane from cellulose, starch, etc. Such bacteria would be useful as a pure culture system to produce methane from biomass. This would offer better control on the process with increased efficiency.

Mr Robert Parker.

"In the long term, we will likely see changes in land availability based on agricultural demand and needs, and in the choice of energy crops, which define the biomass yield levels that can be obtained on the available land."

MR ROBERT PARKER, TMO RENEWABLES, UNITED KINGDOM

What has been the most exciting issue working with biomass for your personal life and professional experience? Why did you start working with biomass for energy?

I'm excited to be part of leading a massive reshaping of the global energy landscape. I began working with biomass to help our society shift from fossil fuels to more sustainable and renewable sources of energy. Biomass will play a crucial role in this shift, as the world turns to new sources to meet the growing global energy demand. It's the challenge of pioneering a new industry that makes the work exciting for me. The ability to produce large quantities of fuels for vehicles or energy from a non-crude based feedstock is vitally important in the battle to reduce carbon emissions. What I find particularly interesting is that biomass can be sourced directly from the waste stream. Whether it is literally trash, like MSW, or agricultural waste, such as cassava stalk, we can create fuel from biomass that used to emit even more CO_2 emission sitting in a landfill—all while diversifying energy supply chains, expanding local economies and promoting energy independence.

According to your work and experience how do you see the future for the bioenergy sector?

The bioenergy sector is still at an early stage of development with tremendous growth ahead. Biomass is the only renewable energy source that can replace fossil fuels in all energy markets, from heat to electricity to fuel for transportation, and by 2050 it could sustainably contribute to a quarter, or even a third, of the global primary energy supply. The enormous potential leaves a great deal of room for innovators, like TMO Group, to reset the planet's relationship with energy.

Which areas relating to bioenergy do you think should be developed in the short and long terms? What do you see as the next big step for the development of the field?

The next important steps in the development of bioenergy technologies are largely dependent on the economic framework developed by each country. Trends in the short term will likely focus on efficiency, reliability and sustainability of bioenergy chains, as well as logistics and infrastructure. Progressive policies must be implemented to power this shift, and also help to develop new feedstocks and integrate bioenergy into existing supply chains.

In the long term, we will likely see changes in land availability based on agricultural demand and needs, and in the choice of energy

FM BioEnergy

A division of BOCM PAULS LTD

Specialising in Anaerobic Digestion nutrition and plant optimisation

Systems, technology and nutritional support:

- feedstock supply and diet formulation.
- substrate analysis and advice from farm facilities to Industrial recycling plants.

Anaerobic Digestion specific additives for:

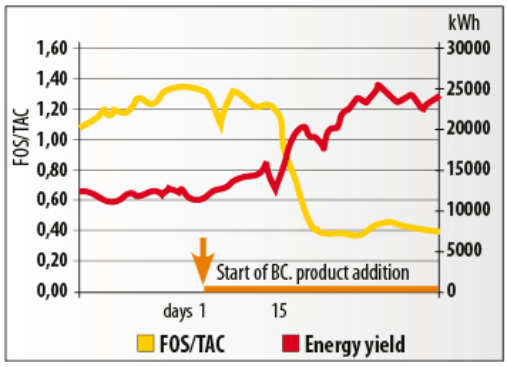
- forage Crops.
- trace element balance.
- enhancing feedstock longevity and performance.
- rapid reliable start-up.
- emergency gas production issues.
- balancing and optimising energy production.

We offer a bespoke service to our customers delivering more efficiency, biogas and profit.

Conserve your silage energy

Conserve your feed stock energy

Increase you fermenter performance



FM BioEnergy

A division of BOCM PAULS LTD

Unit 15A, Gelders Hall Rd,
Shepshed, Loughborough,
Leicestershire, LE12 9NH

Tel: 01509 501830

website: www.feedsmarketing.co.uk/fm-bioenergy

crops, which define the biomass yield levels that can be obtained on the available land. Since access to markets is a critical factor for almost all bioenergy technologies, over the long term national policies will also need to take into consideration grid access and standardization of feedstocks. At TMO, we recognize the need to source from existing supply chains and are currently scaling feedstock abundantly available in regionally networks currently.

How has the exchange of ideas with international partners helped your work or career?

International partnerships play a critical role in my work, and are invaluable in matching technical expertise with regional market insights. By working with Brazilian partners, for example, TMO gained important perspective on Brazilian government policies to sustain and diversify the country's energy system as well as insights into the Brazilian biofuels market, which in turn helped us to refine our program to best meet regional needs. That experience also underscored the importance of governmental support in implementing new technologies and energy programs, and how progressive energy policies can create a business environment to help companies like TMO to continue to develop and deploy our technology.

MR TIMUR IVANOV, RUSSIAN ENERGY AGENCY, RUSSIA

What has been the most exciting issue working with biomass for your personal life and professional experience? Why did you start working with biomass for energy?

Russia is only taking its first step learning about the opportunities that the bioenergy sector could bring to its development. In the last 20 years Russia has gone through fundamental changes. During that period sustainability issues were not given as much attention in comparison to the developed countries that have worked on energy security since the first oil crisis.

My professional life, for more than 10 years, was dedicated to the nuclear power sector. Then I worked in thermal power for 5 years. In both areas I was in charge predominantly for business development and new generation capacities construction.

I started working on bio-energy development in 2009 as the head of the Russian Energy Agency that is responsible for energy efficiency and renewable energy development in the Russian Federation. Now I contribute all my expertise in the power sector to bio-energy and resources saving development, as I consider these areas as truly the most promising ones for Russia's current evolution. It's very challenging to work on the establishment of bio-energy as a genuinely new sector in Russia that provides ecologically sound and economically viable energy.

With my team I work on practical data obtaining the regional bio-potential, developing a legislative and institutional framework, preparing business-cases and bankable feasibility studies as well as bio-innovations proliferation in Russia. I'm convinced that the pilot projects in bio-power are of top-priority for Russia now, with the following replication of the best practices on a serial basis.

Only with such a holistic approach we can achieve the result. It is the most thrilling part of my job: to compose a reality to take place.

According to your work and experience how do you see the future for the bioenergy sector?

Renewable energy is not an alternative energy for our country. However, Russia is focused on the development of the power sector based on local types of fuels in remote areas where there is no gas pipeline availability. According to the Energy Strategy of Russia until 2030, distributed generation is important for progress of the power generating sector, and its development potential amounts to 15% of electric power generation in Russia. It means huge absolute numbers – more than 20 GW of installed capacity.

The bioenergy sector is to play a key role in the distributed energy development in Russia because it can provide the synergy of energy production and waste utilization. There is a huge potential in Russia for the use of abundant forestry, agricultural and municipal wastes for local energy generation in the future. Just to give you some figures: Russian wood resources are 83 billion m3, among those non-merchantable wood equals 24 billion m3. Allowable annual cut of the wood resource in Russia is 600 million m3, but the actual annual cut is only 30% (180 million m3). Annual volume of agricultural complex wastes is about 773 million tons.

"The Bioenergy sector is to play a key role in the distributed energy development in Russia because it can provide the synergy of energy production and waste utilization. There is a huge potential in Russia for the use of abundant forestry, agricultural and municipal wastes for local energy generation in the future."

Which areas relating to bioenergy do you think should be developed in the short and long terms? What do you see as the next big step for the development of the field?

For bioenergy development in Russia it will be the paramount importance to transfer the world's best technologies and localize manufacturing of equipment for renewable energy generation in order to create a competitive advanced industry.

Mr Timur Ivanov.

How has the exchange of ideas with international partners helped your work?

Expertise and the experience of our foreign partners in the bio-field has supported me in the development of the basis for implementations of the bioenergy projects on a serial scale.

Jointly with the World Bank, International Energy Agency, etc. we have implemented several research programs for renewables and bio-energy development in Russia.

Together with the International Financial Corporation we carry out a project of a web-portal "Renewable Energy Sources in Russia: a Guide for Investors" which is being developed, aimed at consolidation and provision to the main stake-holders, of trustworthy and updated information on resources, potential and current initiatives in the field of renewables and bio-energy, as well as investment potential in Russia.

International cooperation was also advanced including development of a joint venture with the Chinese partners, aimed at bioenergy projects implementation in Russia.

Would you like to add something?

In the Post-Kyoto period, the new efficient instruments will play a crucial role in tackling emissions and ecological challenges. Bio-power development is one of the most urgent tasks in that respect. I'm very much concerned about the long-term goal setting and resources planning for the Russian power sector development. As a member of the United Nations Secretary General High-level Group on Sustainable Energy for All, I'm convinced that Russia has significant responsibility for global energy and ecology sustainability. Bio-energy contribution in that respect is hard to overestimate.

Booker Tate

Global Sugar and Agribusiness Expertise

Sugar, Ethanol & Bio–energy

Development, Management & Technical Services

PHOTO: ROMAN MILERT

By Andrew Potter, World Bioenergy Association

Great ideas deserve to grow

BioenergyConnect is a new place online for the bioenergy industry to network, collaborate and flourish.

THE IDEA FOR BIOENERGYCONNECT was originally conceived over 2 years ago after consultation with major biomass suppliers in Europe. It was identified early on that the biomass industry in particular lacked a 24 Hour resource with the specific function of facilitating the growth of start up agricultural producers of industrial pellets. Very soon after it became clear that this was also true with biogas, biofuel and biomass producers.

The World Bioenergy Association found itself in a unique position to bring its list of contacts together to help these companies establish themselves in the market place by offering non biased assistance and references. As the number of inquiries increased it was decided that we needed a solution that would be self-explanatory and trusted as a source of information for the investors and start-ups to find the best products, services and consultancy available today.

BioenergyConnect quickly went into the design and development phase. Further consultation made it clear that these start up organisations were often startled by the choices laid before them and that the proposed time periods and strategies would often lack clarity and vision. It was, therefore, decided that BioenergyConnect would promote groups of companies within niche areas, offering only the best solutions so that it stood out from the numerous traditional "directories" currently available in the market.

SO WHAT MAKES BioenergyConnect different? And how should it position itself whilst there are currently many large sites offering networking services? The answer is surprisingly simple, and goes back to the ethos of the founding members of the World Bioenergy Association – which is to inform and educate the world about the untapped potential for utilizing Bioenergy for socio-economic and environmental benefit. BioenergyConnect's uniqueness is not only the comprehensive features and functions you would expect on any leading networking platform, but that it has been conceived to be unambiguous in its goal to enlighten, inform and share from a completely neutral perspective.

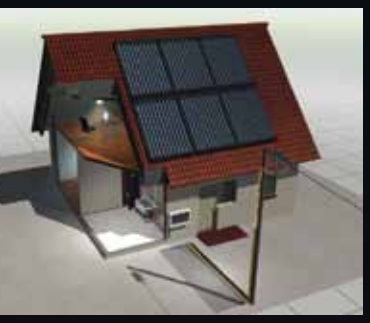
WHAT BIOENERGYCONNECT WILL undoubtedly achieve is to provide a strengthened identity to the industry by sharing our common goal – growth. And we will do this together. This has not been done before in any industry and has to my knowledge never been attempted. It is a bold idea - to build a platform that offers real benefits to companies, large or small, or even the inquisitive individuals just taking their first tentative steps into the world of Bioenergy.

Find out more on:
www.bioenergyconnect.net

BIOENERGY CONNECT

CRAFTENGINE

PROVIDING **RENEWABLE ENERGY** AT A LOW COST



CraftEngine can run on any heat source such as solar thermal heat, waste heat, geothermal heat, waste combustion - or biomass combustion.

CraftEngine, in combination with various heat sources, provides a very competitive alternative to today's Photovoltaic and current Combined Heat and Power Systems.

CraftEngine can be installed in any type of building, ranging from common households and farms to larger commercial buildings in order to cover the various electricity and heating requirements.

The technology is patented.

Visit us at stand B04:64

www.vdg.no

Viking Heat Engines
A company in the Viking Development Group

The purpose of the World Bioenergy Association (WBA) is to promote the increasing utilization of bioenergy globally in an efficient, sustainable, economically sound and environmentally appropriate way.

By Kent Nyström, World Bioenergy Association

Introduction of a sustainable biomass verification scheme

RULES TO GUIDE STAKEHOLDERS and to establish an acceptable strategy for the aggregation of biomass for energy are now more necessary than ever before. This is why the WBA presented a collection of sustainability criteria at COP 16 in Cancun, Mexico in December 2010.

Now the WBA is introducing the next step in this crucial process: ***The Sustainable Biomass Verification Scheme.***

The verification scheme should be used as a manual for accrediting the sustainability of Biomass for Energy. The treatise will explain the criteria that has to be met by the producers of biomass, in order for them to be elligible to display the WBA sustainability logo.

THE ROLE OF THE VERIFICATION processes in this report is to encourage the creation of a global market for bioenergy and biofuels. The minimum universal criteria were developed after comparing the standards, principles, criteria and indicators developed by the existing and emerging voluntary standards around the world.

Instead of creating a totally new verification scheme, we have complied with existing or recently founded standards. By doing this, the meta-standard scheme is built on existing experiences in better management practices and round tables, with international consultation.

The goal of the following verification scheme for biomass is to secure the sustainability criteria for biomass and the supply of biomass in a sustainable way, with clearly defined guidelines and consistent quality assurance for specific purposes.

So, to acheive these aims, when considering the elligibility of an interested party, the scheme must assess the traceability of the resources that are produced and managed. Furthermore, accurate evaluations of energy consumption and green house gas (GHG) emissions must be conducted. And finally, Biomass quality specifications must be adhered to.

TO GUARANTEE A CONSISTENT scheme the processes that are necessary for the production and logistics of biomass will be verified in the scope of this scheme – as a result, aspects of product verification will be combined with those of system verification.

The other major issue is that sustainable production of biomass must be shown to not reduce production or availability of food, fibre and water, or of living space and living standards for rural and indigenous people. Clearly, for the sustainable and equitable production and transport of biomass and biofuels to be done, on a large scale, there must be effective internationally recognized monitoring and verification schemes in place.

For more information please download the SBVS Scheme on www.worldbioenergy.org

BIOGAS
ASIA PACIFIC FORUM

18 - 19 JULY 2012 | BANGKOK, THAILAND

HARNASSING THE FULL POTENTIAL OF BIOGAS IN ASIA INDUSTRIAL, TRANSPORTATION AND POWER GENERATION

Maritje Hutapea
MINISTRY OF ENERGY AND MINERAL RESOURCES
INDONESIA.

Mattias Svensson
SWEDISH GAS CENTRE

Nguyen Thi Minh Nguyet
MINISTRY OF AGRICULTURE & RURAL DEVELOPMENT
VIETNAM

Lee Giok Seng
ANGVA

Alan S. Marchan
C TRADE
PHLIPPINES

Romel M. Carlos, PhD.
INTERNATIONAL FINANCE CORPORATION (IFC)

Zainal Azman Bin Abu Kasim
MALAYSIAN BIOTECHNOLOGY CORPORATION

SUPPORTED BY

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

OFFICIAL MAGAZINE

NGV TRANSPORTATION

ORGANISED BY

ICESN

MEDIA PARTNERS

BIOENERGY International

BULKINSIDE

Eco-Business.com

RE News India

biofuels International

RE DATA BASE

RENEWABLE ENERGY MAGAZINE

OXFORD BUSINESS GROUP

TAKING YOU FROM KNOW-HOW TO SHOW-HOW

WELCOME TO

WWW.WORLDBIOENERGY.COM

WORLD BIOENERGY 2014

27-29 MAY JÖNKÖPING, SWEDEN
+26 MAY AND 30 MAY, TRANSFER TOURS

Book your stand now! Call us: +46 36 15 22 84

Keep up to date Register your e-mail on the web site

WORLD BIOENERGY 2014
Conference & Exhibition on Biomass for Energy
27 - 29 MAY 2014, JÖNKÖPING - SWEDEN

Elmia

SVEBIO