

3rd BIOGAS ASIA PACIFIC FORUM

EVENT REPORT

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

02 – 04 JUNE 2014 | JW MARRIOTT HOTEL, KUALA LUMPUR, MALAYSIA



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THE 3RD ANNUAL BIOGAS FORUM

The 3rd Annual Biogas Forum was organized on the 02 – 04 June 2014 at the JW Marriott Hotel in Kuala Lumpur, Malaysia. The largest gathering of biogas professionals, feedstock owners, project developers and government officials of its kind in the region, the conference was attended by over 390 people.

Organized by ICESN and the Malaysian Biotechnology Corporation, the forum featured over 29 presenters sharing updates on policy, technology, and business cases for the utilization of biogas in Asia.

The conference was capped with a site visit to the SIRIM – SIME DARBY joint venture biogas upgrading facility in Carey Island. Funded by MOSTI, the project aims to show the feasibility of upgrading biogas from POME to bio-methane, which is then used to power a car.



DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA



TESTIMONIALS:

"A good conference that contained a decent mix of opinions and opportunities"

- Director, **GazAsia**

"On behalf of the German Biogas Association I would like to thank the organizer for inviting us to the 3rd Biogas Asia Pacific Forum in Malaysia. It has been a very professional and fruitful event. We hope that Biogas will boom in the region and we are glad to be able to share the "German" Biogas experience. A lot lessons have been learned using biogas technology and there is no need to start from scratch again. Together, with partnerships and approved technology biogas can play an important role in the region and we are most happy to contribute."

- Clemens Findeisen, **German Biogas Association**

"The Biogas Asia Pacific Forum provides a unique opportunity to meet the key players of the biogas and biogas upgrading industries in the Asia Pacific region. SEPURAN Green Cartridge system developed by Evonik has generated a high level of interest as the industry moves to maximize the value of biogas by upgrading to Biomethane. This further contributes to lowering the carbon footprint and promoting the adoption of sustainable practices in the industry."

- Dr. Fabien Cabirol, **Evonik Industries**

"The forum was a very informative and was a great guide as to where the market is currently headed."

- Kan Soon Kong, **Genting Plantations Berhad**

"The Biogas Asia Pacific Forum was a great way for us to expand our knowledge and keep us up to date in such a fast growing industry. The latest technology and innovative designs were explained and discussed in detail allowing us to fully understand the mechanics behind them. We would definitely like to attend such future events."

- Nik Azmi Nik Mahmud, Student, **Universiti Teknologi Malaysia**

"We have found that the Biogas Asia Pacific Forum has helped us keep relevant in a time when technological innovations are abundant. It would be great if the Asia Pacific Biogas Alliance would tie up with other similar organisations such as the Malaysian Biogas Association in promoting more of these current ideas."

- Dr. Ir. Kumaran Palanisamy, Center For Renewable Energy, **Universiti Tenaga Nasional**

"The Forum has allowed us to learn more about the biogas developments in the region and has also allowed us to network with other industry professionals around the world."

- Ismael Japakiya, **Precise Power Producer Co.**

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KEY INFORMATION:

Dates: 02 – 04 June 2014

Venue: JW Marriott, Kuala Lumpur, Malaysia

Total Number of Delegates Attended: 377

Total Number of Exhibitors : 19

Silver Sponsor: **SAFE SPA**

Sponsors: **AIR LIQUIDE
ALTERNATIVE ENERGY
CORPORATION
BIODOME ASIA
BTS BIOGAS**

**CATERPILLAR
CAT FINANCIAL
TRACTORS MALAYSIA
EVONIK INDUSTRIES
EXIM BANK**

**GENTING PLANTATIONS
KIS GROUP
KONZEN
SEBIGAS – UAC
XEBEC**

Exhibitors: **ASIABIOGAS
BIREME
CLIMATE ENERGY**

**FOV BIOGAS
MEHLER TECHNOLOGIES
MULTICO**

PRIME ASIA CONNECT

Supporting Partners: **ANGVA
ASIA PACIFIC BIOGAS ALLIANCE
EU-MCCI
GERMAN BIOGAS ASSOCIATION**

**INDIA BIOGAS ASSOCIATION
SINGAPORE BIOGAS ASSOCIATION
SINGAPORE BUSINESS FEDERATION**

Media Partners: **ASIA MONITOR
BIOENERGY
OXFORD BUSINESS GROUP**

Organizers: **ICESN
MALAYSIAN BIOTECHNOLOGY CORPORATION**

The floor plan shows an exhibition hall with various booths and a conference area. The booths are numbered 01 through 19, with some areas reserved. The layout includes a central aisle, a staircase, and a conference area on the right. The exhibitor listing is provided below the plan.

EXHIBITOR LISTING

- 01 - SAFE SPA
- 02 - MALAYSIAN BIOTECHNOLOGY CORPORATION
- 03 - EXIM BANK OF MALAYSIA
- 04 - XEBEC
- 05 - CATERPILLAR
- 06 - RESERVED
- 07 - MULTICO
- 08 - BIODOME ASIA
- 09 - KONZEN CLEAN ENERGY
- 10 - SEBIGAS UAC
- 11 - CLIMATE ENERGY SDN BHD
- 12 & 13 - BTS BIOGAS SRL / GMBH
- 14 - EVONIK INDUSTRIES AG
- 15 - ALT ENERGY (M) SDN BHD
- 16 - PRIME ASIA
- 17 - KIS
- 18 - BIREME GROUP
- 19 - ASIA BIOGAS

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19 - ASIA BIOGAS

FOV FABRICS AB
MEHLER TECHNOLOGIES

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA



SPEAKERS & AGENDA

DAY ONE – 02 JUNE 2014

09:00 Opening Remarks

Vincent Choy, *Director*
ICESN

"Biogas is the Fuel of the Future Now"

09:15 **OPENING KEYNOTE:
 THE MALAYSIA BIOGAS MASTERPLAN:
 CREATING A COMMERCIAL BIOGAS HUB**

Razwin Sulairee bin Hasnan Termizi
Chief Operating Officer
MALAYSIA BIOTECHNOLOGY CORPORATION

"There is opportunity to produce over 3 billion cubic meters of biomethane in Malaysia every year!"

09:45 **BIOGAS OPPORTUNITY IN MUNICIPAL
 SOLID WASTE**

Dr. Mohd Pauze Bin Mohamad Taha
*Director of Research Technology, Industrial and
 Construction Waste Division*
PPSPPA

10:10 **BIOGAS OPPORTUNITIES IN MALAYSIA**

Sivapalan Kathiravale, *Principal Analyst,
 Emerging Technology*, **MIGHT
 (MALAYSIA INDUSTRY GOVERNMENT
 GROUP FOR HIGH TECHNOLOGY)**

"An integrated approach to biogas is needed for the industry to grow"

10:30 Networking Coffee Break

Panel Discussion
 10:45 **FINANCING BIOGAS INITIATIVES IN ASIA:
 OPPORTUNITIES AND CHALLENGES**

Moderated by:
 Vincent Choy, *Director*
ICESN

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

Panelists:
 Chairil Mohd Tamil
Deputy President / Chief Business Officer
EXIM BANK

Hwee Song Suan
Senior International Account Manager
CATERPILLAR ASIA

Mohd Sharizal Mustapah Kamil, *Vice President of Business & Technology Advisory*
MALAYSIAN DEBT VENTURES (MDV)

"For a financier, what is important is the predictability of cashflows"

11:45 A FUTURE IN BIOGAS UPGRADING PROJECTS IN MALAYSIA

Azhar bin Abdul Raof, *Head of Renewable Energy Research Centre*
SIRIM

12:15 Networking Lunch

OPPORTUNITIES IN BIOGAS PRODUCTION

13:30 BIOGAS DEVELOPMENT IN THE MALAYSIAN PALM OIL INDUSTRY: STATUS, POTENTIAL, & FUTURE PROSPECT

Nasrin Abu Bakar, *Senior Research Officer*
MALAYSIAN PALM OIL BOARD

"As of May 2014, we have 64 completed biogas plants, with 14 more under construction and 150 more in the initial planning stage."

14:00 CASE STUDY: OPPORTUNITIES IN THAILAND'S ENERGY MARKETS FOR BIOGAS POWER

Alessandro Ciceri, *Proposal Engineer*
SEBIGAS UAC CO. LTD.

14:30 COMPARISON OF GROUND VS TOP MOUNTED BIOGAS HOLDER APPLICATIONS

Matthew Dickinson, *Managing Director*
BIODOME ASIA

OPPORTUNITIES IN POWER GENERATION

15:00 BIOGAS PROJECTS – A LENDER'S PERSPECTIVE

Hwee Song Suan, *Finance Manager*
CATERPILLAR ASIA

15:20 BIOGAS AS A TRULY RENEWABLE ENERGY SOURCE: GENERATING POWER THROUGH BIOGAS

Dr. John C Y Lee, *Sales Manager, Electric Power Division*, **CATERPILLAR INC**

15:40 Networking Coffee Break

16:00 CASE STUDY: 6 POME TO BIOGAS PROJECTS WITH ZPHB TECHNOLOGY

Mr. K R Raghunath, *Director*
KIS GROUP

16:30 ENERGY CROP; THE DRIVE TOWARDS THAILAND ALTERNATIVE ENERGY TARGETS

Pruk Aggarangsi, Ph.D., *Deputy Director Energy Research and Development Institute - Nakornping*, **CHIANG MAI UNIVERSITY, THAILAND**

"Thailand wants to install 3,600 MW of electricity to be generated from biogas. 3,000 MW will come from energy corps."

17:00 DEVELOPMENT OF NEW MEDIA (FEEDSTOCK) FOR BIOGAS PRODUCTION

Prof. Dr. Ir. Maizirwan Mel (MMSET), *Biotechnology Engineering Department, Faculty of Engineering*
IUM MALAYSIA

17:30 End of Conference Day One

DAY TWO – 03 JUNE 2014

08:30 Registration

09:00 UPDATES AND THE FUTURE DIRECTION OF THAILAND'S BIOGAS DEVELOPMENT PLANS

Jariya Budnard, *Engineer, Biogas Group Department of Alternative Energy Development and Efficiency (DEDE)*
MINISTRY OF ENERGY, THAILAND
"Thailand is on track to implement its green energy plans"

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

09:20 THE IMPORTANCE OF HIGH-END COMPRESSION IN BIOGAS UPGRADING

Jonas Giuliani
Asia Pacific Markets Development Manager
SAFE S.P.A.

"Technology that is already very well-established in the NGV industry can be used in the Biogas sector just as successfully."

09:50 TRENDS IN BIOGAS COMMERCIALIZATION

Mark Leslie, CEO
ALTERNATIVE ENERGY CORPORATION

10:20 EVOLVING INTO ASEAN BIOGAS MARKET - A STORY BY A BIONEXUS STATUS RENEWABLE ENERGY COMPANY

Jesse Wong, Senior Manager
KONZEN CLEAN ENERGY SDN BHD

10:50 Networking Coffee Break

11:10 AN INTRODUCTION TO MEMBRANE TECHNOLOGIES IN BIOGAS UPGRADING

Dr. Fabien Cabirol
Regional Business Development (SEA)
EVONIK INDUSTRIES AG

"Plantations can save over USD 1 million a year running their fleets on bio-methane rather than diesel."

11:40 VALORIZATION OF BIOGAS THROUGH LIQUEFACTION OF BIO-METHANE

Pierre Roux, Product & Engineering Manager - New Energies Activity, Biogas Upgrading Systems & Hydrogen Refueling Stations
AIR LIQUIDE

12:10 THE ADVANTAGES OF PRESSURE SWING TECHNOLOGY IN BIOGAS UPGRADING

Kurt Sorschak, Chairman of the Board, CEO and President, **XEBEC**

12:40 Networking Lunch

13:40 BIOGAS AS A KEY IN FUTURE ENERGY SYSTEMS - TRENDS IN GERMANY AND OPPORTUNITIES IN DEVELOPING AND EMERGING COUNTRIES

Clemens Findeisen
Consultant Development Cooperation
GERMAN BIOGAS ASSOCIATION

14:00 OPPORTUNITIES FOR BIOGAS AS AN ALTERNATIVE NGV FUEL

Lee Giok Seng, Executive Director
ASIA PACIFIC NATURAL GAS VEHICLES ASSOCIATION (ANGVA)

"Last year, I was the only one with a paper on using CBG for vehicles. I am very glad that this year, everyone else is talking about it!"

14:30 **CASE STUDY: MUNICIPAL WASTE AND LANDFILL GAS PROJECT IN THE MIDDLE EAST – POWERING DUBAI'S NGV PROGRAMME**

Fazal Ali Khan, CNG Manager,
EMIRATES GAS

15:00 **CASE STUDY: CBG FROM AGRICULTURAL WASTE WATER AS A COST EFFECTIVE ALTERNATIVE FUEL FOR THAILAND**

Methar Thongma, Manager, NGV Business & Product Development Division, NGV Strategy & Business Development Department
PTT PUBLIC COMPANY LTD

15:30 Networking Coffee Break

16:00 **CASE STUDY: LIQUEFIED BIOGAS PROJECT FOR VEHICLES IN THE PHILIPPINES**

Richard Lileystone, CEO
GAZASIA

16:30 **ANAEROBIC DIGESTION OF PALM OIL MILL EFFLUENT (POME) AND EMPTY FRUIT BUNCHES (EFB): MAXIMIZED BIOGAS PRODUCTION THROUGH FULL UTILIZATION OF PALM OIL PROCESSING WASTES AND BY-PRODUCTS**

Anders Ek, Chief Scientist
ASIA BIOGAS GROUP

17:00 End of the Biogas Asia Pacific Forum

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Biogas Asia Pacific Forum In the Media

Media Title : The Borneo Post (Sabah)
Headline : Govt to revise incentives for biogas to woo more investments
Date : 3 June 2014
Page : 20



Govt to revise incentives for biogas to woo more investments

KUALA LUMPUR: The government intends to revise incentives for biogas to woo more investments in that sector and realise plans to become Asia's biogas hub and channel more energy into the national power grid, the Malaysian Biotechnology Corporation (BiotechCorp) said yesterday.

This initiative would move the government closer to realising Asia's biogas hub plans and channel more energy into the national power grid, said its Chief Operating Officer Razwin Sulairee Hasnan Termizi.

"Our research revealed that the biogas industry will contribute around RM20 billion to the country's Gross Domestic Product growth. However, it's contribution remains dependent on technology readiness in the next six years," he told reporters at the Third Biogas Asia Pacific Forum here yesterday.

The three-day forum, which ends on Wednesday, is organised by the country's lead development agency for the biotech industry, BiotechCorp, and International Clean Energy and Sustainability Network. – Bernama

Media Title : Nanyang Siang Pau
Headline : Field of biology contribution 150 billion in 6 year
Date : 3 June 2014
Page : 2



拉惹维苏莱里：15%来自生物燃气 生物领域6年贡献1500亿

【吉隆坡电】大马生物科技公司首席执行官拉惹维苏莱里说，预计生物领域在接下来六年为国内生产总值贡献1500亿令吉。其中有15%（约200亿令吉）来自生物燃气。

拉惹维苏莱里是在吉隆坡举行的“亚太生物燃气论坛”开幕式上作上述发言的。他是在接受媒体采访时说：“生物燃气是未来能源的重要组成部分，也是实现可持续发展的重要途径。”

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Media Title : The Edge Financial Daily
Headline : Biogas potential not fully captured by local firms
Date : 3 June 2014
Page : 4



'Biogas potential not fully captured by local firms'

by Yen Ne Foo

12 June 2014

KUALA LUMPUR: Most of the country's need for natural gas can be met with locally produced biogas, but Malaysian companies are failing to capture the commercial potential in the alternative energy source.

"There is just a lot of biogas and it is just sitting there," International Clean Energy & Sustainability Network director Vincent Choy told The Edge Financial Daily after the opening of the Third Annual Biogas Asia Pacific Forum yesterday.

According to Malaysian Biotechnology Corp Sdn Bhd (BiotechCorp), a government-linked agency tasked with promoting and encouraging the use of biotechnology, 1.9 billion cubic metres of natural gas produced by palm oil mill effluents (POME) in 2013 constituted 24% of Malaysia's gas consumption.

One of this, the industrial sector consumes slightly above 50% of the total national gas consumption.

Harvesting and harnessing bio-

gas from readily available palm oil plantations, agriculture plants, and municipal and solid waste make sense for a country such as Malaysia which is still importing natural gas from countries such as Qatar and Russia, Choy said.

"Theoretically, if you do POME alone, you can meet most of your natural gas needs. Then there is agricultural, municipal and solid waste management. You add all that together, it will fulfil 60% of Malaysia's gas consumption," he added.

Recognising the value of biogas as an energy source, the government mandated the installation of biogas trapping and methane avoidance facilities at all palm oil mills by 2018.

But Choy said this has done little to encourage plantation owners to invest in technology to harvest biogas. The policy only mandates the trapping, but not the harvesting of biogas.

"Malaysia is not really using it

because a lot of oil palm plantations don't see the value. [Plantation owners] say that they are in the business of doing palm oil, not in the business of selling gas."

Before the collapse of the carbon market, the primary driver for biogas projects in Malaysia was getting carbon credits. When we did that, a lot of biogas developers just built the biogas plants and then burnt it [biogas] away and they didn't do anything with it," Choy explained.

He said there is a need for a "pilot-scale" and "an integrated approach" to develop a fragmented Malaysian biogas industry.

Malaysia has a monopoly with gas being sold by Petrolim Nasional Bhd and distributed by Gas Malaysia Bhd. So, it [biogas] is a choice for private companies to come in and be a gas distributor.

"But, there are a lot of players to put together for the Malaysian biogas industry to work... You need Gas Malaysia to sit down and consider letting people inject biogas into the

grid and sell it to some other people... you need industry players to come together and say that there are all these opportunities available, so why are we just burning it away?"

Despite the muted reception, Choy said that people's perception is slowly changing and there has been an "upsurge" in interest in the biogas industry in the last year.

BiotechCorp chief operating officer Razwin Sulairee Hasnan Termizi said the agency is in the midst of discussions with the ministry of finance to finalise a tax incentive scheme for companies which participate in the biogas industry.

He said the private sector is expected to drive biogas development in Malaysia.

He added that under Budget 2014, Malaysian companies are incentivised to acquire platform technologies, invest in pilot projects and set up centres of excellence.

BiotechCorp is also targeting for the biogas value chain to contribute some RM20 billion to the country's gross domestic product by 2020.

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Biogas Asia Pacific Forum In the Media

Media Title : Utusan Malaysia
Headline : Biogas sumbang RM20 bilion kepada KDNK
Date : 3 June 2014
Page : 17



Biogas sumbang RM20 bilion kepada KDNK

KUALA LUMPUR 3 Jun - Industri biogas tempatan dijangka menyumbangkan kira-kira RM20 bilion kepada Kelantan Dalam Negara Kecil (KDNK) menjelang tahun 2020, melalui projek peralihan yang dihasilkan oleh kerajaan terhadap industri tersebut pada masa ini.

Ketua Pegawai Operasi (Chief Executive Officer) BioTechCorp, Razwan Sulaiman Hassan berkata, sumbangan itu adalah tambahan atas 10 peratus daripada RM150 bilion nilai pelaburan di dalam sektor biokomunikasi kepada

KDNK menjelang tempoh yang sama.

Katanya, usaha itu dapat dilihat melalui syarikat-syarikat tempatan yang telah melaksanakan beberapa projek peralihan yang menghasilkan peralihan berkesan biogas telah bernilai dan bernilai besar, selain dengan bantuan kerajaan yang menawarkan insentif kepada pemain-pemain industri yang terlibat.

"Rajuan oleh BioTechCorp menunjukkan rancangan industri biogas ini mampu menyumbangkan sekitar RM20 bilion kepada KDNK. Namun, jangkaan ini tetap bergantung kepada kemajuan teknologi dalam tempoh masa tahun akan datang," katanya pada sidang akhbar sempena berlangsungnya Forum Biogas Asia Pacific Forum di sini hari ini.

BioTechCorp sebelum ini telah memperkembangkan sektor biokomunikasi melalui projek peralihan biogas kepada KDNK sejak 2008 dan akan mencapai RM20 bilion.

Idan Razwan, ketuaannya yang bertanggungjawab sektor ini kepada KDNK negara negara maju telah sekitar 10 peratus. Tambahnya, dalam usaha

Malaysia mencapai status negara maju, sumbangan sektor ini perlu diingkatkan.

Katanya, industri biogas kini lebih terarah kepada pengumpulan tenaga untuk dibekalkan kepada sistem grid elektrik negara, bagaimanapun sumbangannya masih kecil.

"Pengalihan industri biogas juga dilihat sebagai satu keperluan tambahan pada Malaysia kini menggalakan pembangunan pesat seperti pembangunan kawasan-kawasan komersial, perumahan dan pembangunan bandar," katanya.

Media Title : The Malaysian Reserve
Headline : Biogas to hit 15% of bio economy GDP by 2020
Date : 3 June 2014
Page : 4



Biogas to hit 15% of bio-economy GDP by 2020

BioTechCorp projects optimistic KDNK in GDP contribution within next 10 years

By LINDA KINCHARD

BIOTECHCORP biogas sector is expected to contribute 15% to the country's KDNK by 2020, the company's chief executive officer said today.

Speaking at the 2014 BioTechCorp Summit, Razwan Sulaiman Hassan said the company's biogas sector is expected to contribute 15% to the country's KDNK by 2020, the company's chief executive officer said today.

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Media Title : New Straits Times
Headline : High growth potential in biogas industry
Date : 3 June 2014
Page : 5



High growth potential in biogas industry

WASTE-TO-ENERGY PROJECTS: Bioeconomy set to hit RM150b target by 2020

By THE STRAITS TIMES

MALAYSIA's biotechnology industry is set to hit RM150 billion in gross domestic product by 2020 from the current industry size of a handful of biogas plants in Peninsular Malaysia and Sabah hooked to the national power grid.

"We (BioTechCorp) biotechnology is able to achieve a target of RM150 billion by 2020 and the biogas sector should make up 15 per cent contribution at RM20 billion," said BioTechCorp chief executive officer Razwan Sulaiman Hassan.



BioTechCorp chief executive officer Razwan Sulaiman Hassan.

"We need to capitalise on our natural resources to value add on our biotechnology industry. It is not biotechnology alone that is the key to success. It is the combination of biotechnology and other industries," he said after the opening of the 3rd Biogas Asia Pacific Forum, here, yesterday.

BioTechCorp is the government-owned biotechnology company under the Ministry of Science, Technology and Innovation tasked to promote commercialisation of biotechnology in the nation.

At its simplest, a bioeconomy describes a future in which people use renewable resources for food and bio-plastics. Instead of an economy dependent on the extraction of fossil fuels such as petroleum and coal, new raw materials are derived from agricultural by-products and livestock waste like straw, fish, plants or even protein-packed animal feed.

For instance, a bioeconomy by leveraging on our competitive edge of our natural resources, such as oil palm biomass, will ultimately propel Malaysia's socio-economic position to greater heights.

Throughout Malaysia, plantation companies have started the ball rolling by capturing greenhouse gas from mill sludge and turn it into clean energy by burning it in biogas plants. These anaerobic digesters create friendly biogas that feed on organic matter to produce methane gas and nutrient.

last, public buses and even cooking gas in the kitchen. Alternatively, bio-methane can then be captured and converted to biogas and fertiliser, there is no chance of a smelly mess and polluting them. While the organic fertilizer is ploughed back into the fields, greenhouse gas extracted from the biogas plants is fed into a combined waste and power plant at the mill to generate electricity for the surrounding community in this sense.

Biogas operations that can supply large amounts of electricity to hook up to the national grid and are successful operations with sustainable Energy Development Authority will be paid according to the feed-in tariff.

Malaysia is targeting 300 biogas plants by 2020. This outcome is expected to generate about RM2.4 billion in gross national income and create 12000 jobs by 2020.

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

Post Show Report

The 3rd Asia Pacific Biogas Forum held in Malaysia was a huge success! The event was hosted at the JW Marriott Hotel in Kuala Lumpur, Malaysia from the 2nd to the 4th of June 2014. This so far, was the largest gathering of biogas professionals, feedstock owners, project developers and government officials of its kind in the region and was attended by over 350 people.

The forum featured 29 speakers from around the globe sharing updates on policy, technology, and business cases for the utilization of biogas in Asia. The forum took place over 3 days and day one was opened by ICESN Director, Vincent Choy.

The basics of biogas production, utilization and upgrading processes were discussed by many of the speakers. Everything from the management of feedstock, to anaerobic digestion, power generation and the treatment of raw biogas to produce bio-methane was discussed during the conference.

Key highlights included presentations that gave feasibility analysis to using bio-methane for vehicles, LNG from biogas, the energy corps programme in Thailand and many more!



Vincent Choy, Director, ICESN



Razwin Sulairee bin Hasnan Termizi, COO, BiotechCorp



Dr. Mohd Pauze Bin Mohamad Taha, Director of Research Technology, (PPSPPA)

Opportunities in Malaysia

Following the opening speech, Razwin Sulairee bin Hasnan Termizi, COO of BiotechCorp spoke on Malaysia's biogas master plan. It was explained that Malaysia has feedstock in abundance; from palm oil mill effluent (POME) to effluent from sewage treatment plants and municipal solid waste that can generate a possible 300 mmscfd of natural gas. It was stressed that more than half of Malaysian palm oil mills were not connected to the grid presenting huge potential for compressed biogas (CBG) distribution.

Dr. Mohd Pauze Bin Mohamad Taha of Solid Waste Management and Public Cleansing (PPSPPA), was up next and spoke about the biogas opportunities for MSW in Malaysia. An overview of the waste composition in Malaysia was presented together with the country's targets for waste reduction through recycling and sorting by material recovery facilities. Objectives are to reduce solid waste to landfills by 40% and reduction of greenhouse gas (GHG) emissions by 38%. These initiatives are further supported by new food waste to biogas projects.

Sivapalan Kathirivale, principal analyst at Malaysia Industry Government Group for High Technology (MIGHT) talked about the importance of an integrated approach towards biogas development in Malaysia. A demand-supply map considering multiple feedstocks and demand for biogas would speed up development as industries are making plans independently and not efficiently, not considering the availability of alternate feedstocks in the immediate vicinity and the need for biogas/electricity.

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

MIGHT aims to be the bridge from the private sector to the government by harmonizing current initiatives and pooling together key stakeholders towards investment in biogas and biomass industries.

A 3-man panel made up of experienced representatives from EXIM Bank (Chairil Mohd Tamil), Caterpillar Asia (Hwee Song Suan) and Malaysia Debt Ventures (Mohd Sharizal Mustapah Kamil) was gathered to discuss opportunities for biogas projects in Asia to get financing from their respective organizations. The expert panel answered various questions moderated by ICESN Director, Vincent Choy and helped give an idea to companies seeking financing for their projects on which projects are more likely to receive financing and why. They covered issues such as what reasons there were for new project proposals to be rejected when seeking financing, the initiatives that are currently in place for small investment projects and what the alternative funding options available are. It was stressed that it is imperative for companies seeking financing to show believable cash flows from their projects.

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Sivapalan Kathirivale, *principal analyst, Malaysia Industry Government Group for High Technology (MIGHT)*



A 3-man panel made up of experienced representatives from **EXIM Bank** (Chairil Mohd Tamil), **Caterpillar Asia** (Hwee Song Suan) and **Malaysia Debt Ventures** (Mohd Sharizal Mustapah Kamil)

Opportunities in Biogas Production

This was followed by talks from SIRIM and MPOB on the future prospects and potential of biogas projects in Malaysia. These were focused on the use of POME to generate upgraded biogas. The upgraded biogas can be used to generate significant cost savings



Azhar bin Abdul Raof, *Head Renewable Energy Research Centre*



Nasrin Abu Bakar, *Senior Research Officer MALAYSIAN PALM OIL BOARD*



Marco Merlo Campioni, *Chief Executive and Technical Officer, SEBIGAS UAC CO. LTD.*

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

at oil palm plantations. There were discussions on the standards and quality development of gas generated at the plants and how exactly the gas could be allocated for cost saving on site. As of May 2014 there are 64 completed biogas plants with 14 under construction and another 150 have been planned. The government hopes to have all of their 434 palm oil mills to have biogas facilities by 2020.

Sebigas then conducted a case study report on their projects in Thailand on the use of napier grass, pig manure and sugar cane waste as feedstock. They currently are designing and building 10 plants in the north east region of Thailand. These plants are able to produce 1.5 MWe and have great benefits for the environment and the local rural economy.

Biodome Asia followed up with a very detailed presentation on ground vs top mounted biogas holders. A comparison was made and the pros and cons to each type of storage mount were covered thoroughly. The mechanics and functionality between the two types of storage mounts was also discussed. It was concluded that tank mounted units would allow for savings of up to \$US 8000 per tank.



Matthew Dickinson, *Managing Director*
BIODOME ASIA



Hwee Song Suan of **Caterpillar Asia**



Dr. John C Y Lee, *Sales Manager, Electric Power Division,*
CATERPILLAR INC

Opportunities in Power Generation

Hwee Song Suan of Caterpillar Asia then gave his views from a lender's perspective. He further explained what was discussed during the panel discussion on financing biogas projects. He brought up some key points explaining that there are some key issues which are looked at and it really depends on the structure of the relationships between the involved parties; the feedstock supplier, the power companies and the government. These structures normally determine the eligibility of the project for financing. He also mentioned that electric power company contractors should be able to guarantee a consistent output. Other factors that were important were whether or not the biogas developer was a shareholder and the operator's level of experience.

Dr. John C. Y. Lee of Caterpillar's electric power division went on to talk about the technology available from them which can help make biogas a reliable and working alternative source of fuel. He spoke about how upgrading technology is very important in determining the efficiency of a project. He stressed that although efficiency can be increased with increased expense; it is not always necessary and is dependent on the size and capital available for the project.

Mr. K R Raghunath, Director of KIS group then proceeded to speak about ZPHB (Zero Pollution Higher Biogas) technology. KIS group currently has 6 projects operating in Indonesia and another two in India. They are touting the first pondless system that will capture biogas with their unique technology of up to 85-90% of BOD and COD removal. He went on to explain in further detail the success of their 6 plants that are already in operation.

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA



Mr. K R Raghunath, Director of KIS group



*Pruk Aggarangsi, Ph.D., Deputy Director Energy Research and Development Institute - Nakornping
CHIANG MAI UNIVERSITY, THAILAND*



*Jariya Budnard, Engineer
MINISTRY OF ENERGY, THAILAND*

Thailand Alternative Energy

Pruk Aggarangsi, Deputy Director Energy Research and Development Institute from Chiang Mai University ended the first day by speaking about Thailand's plans to supplement their energy makeup with energy crops. Thailand's main energy crop is napier grass, however they also have numerous other biogas plants that generate bio natural gas from palm oil mills and livestock farms. More than 90% of these farms will be connected to the grid by 2015. Napier grass has a much higher biomass yield as compared to other energy crops such as maize. It was noted that napier grass does however have a lower methane yield but due to its high yield per annum it is still able to produce more biogas over the same time frame. Thailand plans to produce 3000 MW from napier grass by 2021. This aggressive target is well backed by a long term plan to continue to increase napier grass fields and set up of biogas plants.

Jariya Budnard of the Ministry of Energy opened the second day by speaking on the future direction of Thailand energy. She covered Thailand's energy situation, the country's recent energy policies including the country's Alternative Energy Development Plan (AEDP). This plan calls for the production of over 3600 MW of energy from biogas producing energy crops such as tapioca starch, ethanol and livestock farms. Currently more than 80% of Thailand's farms have biogas plants connected to them. She also followed up on what Dr. Pruk had discussed with regards to napier grass crops and the government's plans to use this energy crop to replace LPG imports. Thailand's Department of Alternative Energy Development (DEDE) and Energy Policy and Planning Office (EPPO) were to act as drivers for private sector development. A new focus of DEDE has been to on waste water produced from food processing and energy crops.

Trending Issues

Jonas Giuliani from Safe S.p.A then gave a brief presentation on Safe S.p.A's background and their wide range of compressors and their various applications. He then spoke about the various biogas applications that were available in Malaysia. Different compressor designs were based on their scales of production. He also spoke about the need for compressors in upgrading, transportation and using biogas as an NGV fuel.

Mark Leslie of Alternative Energy Corp spoke about trends in biogas commercialization. He conducted an analysis of the drivers to commercialization. A link between the regulatory imperatives and how it affects free cash flow availability, human capital and risk allocation was made. It was stressed that successful projects would need to be proven for there to be an adaptation of technology. He also spoke briefly on Upflow Anaerobic Sludge Blanket Digesters for the treatment of wastewater. He explained that UASB digesters method of action and that they are able to reduce BOD concentration and aeration energy by half. This allows for double the power generation when compared to a regular digester.

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA



Jonas Giuliani, Asia Pacific Markets Development Manager, **SAFE S.p.A.**



Mark Leslie, CEO, **ALTERNATIVE ENERGY CORPORATION**



Jesse Wong, Senior Manager **KONZEN CLEAN ENERGY SDN BHD**

Jesse Wong of Konzen Energy then spoke about what it means to be evolving into an ASEAN biogas market. He went on to describe their current running projects; Rinwood in Sarawak, Belian in Indonesia and Panching, in Pahang and the technology that was present in each. He ended his speech by providing the figures to demonstrate that substantial savings could be realized from diesel replacement of up to US\$ 153500 per year by a 500kW biogas plant.

Upgrading Technology and Liquefaction

Fabien Cabirol from Evonik opened up discussion on the use of membrane technology for biogas upgrading. He explained that biomethane, when turned into CBG and sold in Malaysia is not economical as CNG from Petronas is a cheaper alternative. CBG however, can be used for 'in-house' use and has the potential to generate great savings as a diesel alternative. The idea here is to use CBG for vehicles being used at plantations and having the vehicle engines converted to dual fuel engines that will be able to run on CBG and diesel.

Dr. Fabien then went on to talk about Evonik's Green Cartridge System for membrane upgrading. The concept behind this technology was covered in some detail. It was explained that the membrane is basically a cylindrical cartridge that the gas runs through after being produced. The membrane then acts as a sort of filter, separating the gas by its various constituents to produce a higher methane yielding end product. This is achieved by the use of a special polymer fiber that slows down the methane as it's passed through the tube. One neat part of the design is that the cartridges can be fine-tuned according to the H₂S composition while not compromising the membrane's life-span.

Pierre Roux of Air Liquide spoke on the valorization of biogas through liquefaction of biomethane. He explained that liquefaction created savings opportunities through cost reduction due to the lower density of LBG. LBG can be used for vehicles on-site and LBG is a cost effective alternative to CBG when fuelling larger vehicles such as trucks and buses.



Dr. Fabien Cabirol, Regional Business Development (SEA) **EVONIK**



Pierre Roux, Product & Engineering Manager - New Energies Activity, Biogas Upgrading Systems & Hydrogen Refueling Stations, **AIR LIQUIDE**



Kurt Sorschak, Chairman of the Board, CEO and President, **XEBEC**

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

Kurt Sorschak from Xebec then looked at the advantages of kinetic pressure swing adsorption (PSA) technology. It was explained that this technology has applications in both landfill and digester based systems. It allows for removal of water, carbon dioxide, nitrogen and oxygen. Kurt also mentioned that Xebec has been working with Evonik on some specialized custom polyimide hollow fiber membrane systems.

Xebec has also developed a hybrid system that makes use of both membrane and PSA in a single plant. The idea here is that the gas is upgraded via the membrane system prior to PSA. This hybrid system offers superior methane recovery and gas purity with a competitive CAPEX and low OPEX. It is also able to accommodate variations in feedstock while still producing up to 96% biomethane with the only downside that it is produced at a slightly lower recovery rate.

The Situation in Germany

Clemens Findeisen of the German Biogas association then provided updates as to the biogas situation in Germany and the opportunities present in emerging countries. Prior to this year, biogas had never been under siege by authorities. The Renewable Energy Law (REL) was recently amended; the German government wants to delete without replacement both raw material remuneration classes for the use of energy plants and liquid manures in addition to the technology bonus for biogas treatment and in-feed into the natural gas grid. This can have dire consequences for the sustained development of the industry in Germany. Many biogas companies are working to get the REL reworked to ensure the continued growth of the industry. Clemens also spoke a bit about the development and opportunities present in France, Turkey, Canada, Argentina, Malaysia and Thailand.



Clemens Findeisen, Consultant Development Cooperation, **GERMAN BIOGAS ASSOCIATION**



Lee Giok Seng, Executive Director, **ANGVA**



Fazal Ali Khan, CNG Development Manager **EMIRATES GAS LLC**

Biogas as an NGV Fuel

Lee Giok Seng, executive director of ANGVA then spoke about the opportunities for biogas as an NGV fuel. He mentioned that numbers of NGVs are expected to increase by 65% from 2010 to 2040. He also mentioned that there was great potential for biogas in Malaysian transport and industry sectors through diesel substitution. He did note that there are apparent barriers that are impeding rapid adoption of biogas in NGVs. He attributed this impediment to the lack of government support, the fact that there is no sale value of the gas due to subsidies on CNG and LNG making biogas more expensive than these alternatives.

Fazal Ali Khan of Emirates National Oil Company commented on Dubai's existing NGV program. This program is a joint venture with the Dubai Municipality in an attempt to reduce natural gas imports from Abu Dhabi. Normally waste gas from sewage and landfills is flared because the gas requires pressurization to be of any use. The initiative supports boosting the gas pressure, cooling and then drying it which then allows the gas to be compressed or upgraded. Currently there is no natural gas pipeline infrastructure in Dubai which means that trailers need to be used for transportation of the gas. The initiative aims to set up mother-daughter stations at dedicated premises in Dubai to reduce Dubai's carbon footprint.

DEVELOPING A BIOGAS HUB IN COMMERCIALIZING BIOGAS FOR ASIA

Case Studies

Mehthar Thongma of PTT PLC then presented a case study on CBG from agricultural waste water as being a cost effective, alternative fuel for Thailand. After giving a brief description of the CBG supply chain in Thailand he proceeded to speak about the a few biogas projects that they have running in Thailand. The first being in Chiang Mai which uses wet swine manure and crushed napier grass to produce 11000 Nm³ of biogas per day.

The second being a project in Prachaub which is still only in the planning stages which will be a CBG plant at a palm oil mill. He laid out the benefits of such projects and governments role in the first plant's success.

Richard Lileystone of Gaz Asia presented his case study on liquefied biogas for NGVs in the Philippines. In the Phillipines primary use of biogas is for use as a vehicle fuel. The case study was on the Lian Batangas landfill site. This presents a regular feedstock supply which is available 340 days a year. Biomethane generated is liquefied and plants produce up to 9000 tonnes per day. The plant also produces ample amounts of food grade quality carbon dioxide which is sold for other industrial uses. There is also strong government backing for Gaz Asia initiatives. There is a 20% discount on biomethane relative to petrol and this cost is fixed for the next 3 years. He also spoke briefly of the environmental benefits of biomethane use when compared with fossil fuels and the detrimental effects of air pollution.



Methar Thongma, Manager, *NGV Business & Product Development Division, NGV Strategy & Business Development Department, PTT PUBLIC COMPANY*



Richard Lileystone, CEO, **GAZASIA**



Anders Ek, Chief Scientist, **ASIA BIOGAS GROUP**

Maximizing Biogas Production

Anders Ek, Chief Scientist of Asia Biogas Group, ended the 2nd day of the conference and spoke about production of biogas at palm oil mill plantations from POME and EFB. It is possible to increase gas production by pre-treating EFB before sending it to the digester. These pre-treatment processes are carried out in aim of breaking down the high percentage of lignin present in EFB. This is because lignin reduces the effectiveness of the digestion process. By pre-treating the feedstock in this way it allows for increased gas production and hence higher MW generation.

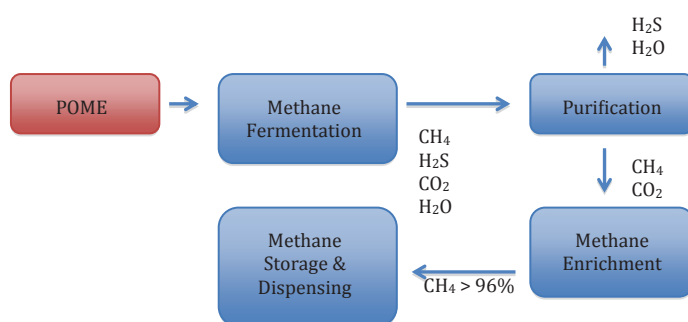
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SITE VISIT

On the third and final day of the forum, registered participants were taken down to Carey Island, Selangor for a site visit to Malaysia's first bio-natural gas pilot plant. It's a joint project by SIRIM and Sime Darby aimed at demonstrating the potential of creating BioCNG as a petrol replacement via methane capture from POME digestion.

Delegates from the Biogas Asia Pacific Forum visited the biogas upgrading pilot project between SIRIM and SIME DARBY on the 04 June 2014. The BioNG project was funded by the Ministry of Science Technology and Innovation (MOSTI) in 2010 and was recently commissioned in 2013. The main objective of the project was to capture and upgrade biogas to automotive grade fuel.



The design capacity was for 600Nm³ of BioNG per day with methane content of over 95%. POME from the mill was transferred to the digester and the output biogas is stripped of H₂S through adsorptive removal. CO₂ is then removed in a scrubber and stored in a buffer storage tank that pushes up the pressure to 10 bar. The bio-methane is then fed through a high pressure compressor taking the pressure up to 200 bar and injected through a CNG dispenser into a CNG tank at the back of the bio-methane vehicle.