Biomethane in developing and emerging countries

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Consultant at the German Biogas Association
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Content

• German Biogas Association
• Biomethane examples in developing and emerging countries
• Incentives and funding for biomethane projects
Objective: promotion of the biogas sector

- Promotion of the biogas sector
- Promotion of a sustainable energy supply
- Definition of legal framework for reliable and long-term investments
- Creation of adequate technical rules and standards
- Promotion of R & D
- Exchange of information
- Members service

Lobbying on federal state, federal and EU level in the following fields:
- Renewable Energy Act (EEG)
- Energy management
- Regulatory approval
- Environmental laws
- Laws on agricultural issues
- Tax law
- ...

4,800 Members
- Operators of biogas plants
- Providers of feedstock
- Research Institutions
- Interested private individuals
- Public authorities
- Lawyers
- Companies and manufacturers
- Corporate finance
- Planners, advisers, laboratories

40 employees dedicated to the topic
International Agenda of the German Biogas Association

- International Affairs Department: 7 staff members
- Supporting members with information about the international biogas markets
- Biogas Convention and Trade Fair
- Supporting Biogas Associations, Biogas Know-How and Trainings worldwide
- Cooperation with international organizations – promoting Biogas in Developing- and emerging countries
Publications in English language

biowaste-to-biogas.com

german-biogas-industry.com

biogas.org

biogas-safety.com

In preparation: Biowaste to Biomethane
Content

- German Biogas Association
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The use of biomethane in the transport sector – a viable option?

http://sutp.org
• **Project Biosurf, Bio**gas as S**U**stainable and R**enewable F**uel
  • European Union Project, Horizon 2020 Programm
  • BIOSURF (BIOmethane as SUSTainable and Renewable Fuel) aims to increase the production and use of biomethane (from animal waste, other waste materials and sustainable biomass), for grid injection and as transport fuel by removing non-technical barriers and by paving the way towards a European biomethane market.
  • 11 Partners from 8 European countries
  • Topics: National/domestic biomethane, Free market biomethane trade, Sustainable raw material supply, Methodology for entitlement to CO2, Networking and cooperation certificates

• [http://www.biosurf.eu](http://www.biosurf.eu)
Biomethane in Brazil

• Biomethan as fuel is still seen as experimental, because…

  Biomethane is not yet offered at public gas stations for natural gas adapted vehicles. There is one small pilot vehicle fleet near Parque Tecnológico ITAUPÚ and the semi-public water company SABESP will hopefully complete during this year a Biomethane project with about 10 vehicles at Franca-SP, using biogas from a waste water treatment station.
Biomethane in Brazil (II)

• Although the specifications of biomethane as vehicle fuel or for injection into the gas grid have been defined by the regulatory body, legislation about pricing and supervision of quality parameters is still missing. (ANP – Agência Nacional do Petróleo, Gás Natural e Biocombustíveis)

• A boost for biogas/Biomethane can be expected within the new public programme RenovaBio, where Biogas and Biomethane are mentioned along with bioethanol and biodiesel.

• Potential of the sugar cane industry

• Large scale biogas upgrading technology is not available nationally.

Probiogás is a Project financed by DKI and executed by GIZ/KfW to promote the use of the technology in Brazil.
Brasil: market waste (vegetable and fruits), sewage sludge/ 2 x 1,4 MW

Fotos: AAT Biogas Technology
Biomethane in India

Legal stand of Biomethane as vehicular fuel

- BIS 2015 - ICS No. 75.060 deals with the Biomethane standards
- For automotive use, Biomethane to be filled in cylinders conforming to IS 15490
- Upgraded biogas is allowed to be stored, transported, and used as a vehicular fuel along with transportation through pipeline
- Petroleum and Explosives Safety Organisation certification is required
Scenario

- Scattered market
- No established player at national level
- Market needs someone offering end to end solution
- Experienced and skilled workforce is lacking
- Government active intervention is needed
- Supply chain management is to be streamlined
Biomethane in India (III)

Biogas, Enrichment and Bottling unit at Jaipur

Indigenously developed LPSA system
India's first Bio-CNG pump pilot plant in Pune. It was jointly inaugurated by Union Minister of Transport Sri Nitin Gadkari and Union Defence Minister Sri. Manohar Parrikar
Biomethane in Indonesia

• Significant interest in biomethane but no commercial projects at the moment.
• No specific government policies targeting biomethane.
• Interest from private sector plantations on replacing diesel vehicles with NGVs to reduce fuel delivery costs.
• Meetings between the Alliance and PGN (State Owned Gas Grid Company) indicate acceptance of biomethane into the grid. However, no specific projects have been proposed so far.
• ICESN is ready to support project owners and developers linking them to PGN to make this happen.
Biomethane in Malaysia

- Currently, 1 commercial operating plant in Malaysia at Sungei Tinggi.
- Gas is transported through CNG Trailers.
- Planning more sites as long as off takers can be found.
- Gas Grid Company (Gas Malaysia) is examining technical proposals for gas grid injection.
- Political framework encourages the development of biomethane with the biogas masterplan specifically advocating for it.
- Biomethane can be used for transportation. Coney Island project was set up by FELDA and SIRIM for pilot project for biomethane for transportation.
Currently, government targets calls for the daily production 4,800 tons of CBG per day.

However, the current production is only 6 tons per day.

Industry is calling for government support for the production of CBG which is currently being hampered by the price ceiling of CBG in the marketplace.


Gas grid injection is possible but gas grid is not very well-developed. CBG will be the main means of transporting gas.
Biomethane in Philippines

- Currently, 1 commercial operating plant in the Philippines generating biomethane at Batangas.
- Gas is however used for power generation. The interest is for Liquid Carbon Dioxide obtained from biogas upgrading.
- No specific government policies targeting biomethane.
- No specific interest or development from private or public sector for biomethane production.
- Underdeveloped gas grid in the Philippines makes gas grid injection pointless.
- Future would be in the transportation of Biomethane through CNG trailers and marine vessels.
Biomethane in Colombia

- Tax incentives for renewables (UPME - Ley 1715)
- Political Framework to inject biomethane into the existing natural gas grid has been set up (Comisión de Regulación de Energía y gas – CREG – resolución 240 – 12/2016)
- The Natural Gas Companies and the Association NATURGAS is trying to push biomethane forward (competition with LPG)
- Potential also from the Palm oil Industry
Biomethane in Chile

- Norma Chilena de Biometano (Nch3213-2010)
- Different technical standards for CNG
- La Farfana project (water treatment) – biomethane upgrading

Proyecto Biogás La Farfana

- Ingeniería:
- Construcción: Constructora HU y Metrogas (ducto)
- Equipos Principales:
  - Desulfurizador biológico: Paques (Holanda)
  - Skid compresión y secado: JJ Crewe (USA)
  - Compresores: Sullair
  - Chiller: York
  - Software: Cruse Control (USA) y DPA (Chile)

Foto: Metrogas
Biomethane in China

13th Five-Year Plan (FYP) on Biomass Energy Development (2016-2020)
- Biomethane is evolving into important development direction in China (commercial utilization as vehicle fuel and for grid injection)
- Biomass liquid fuels extend to biomass based chemical industry products (biorefinery; aviation fuel, chemical raw materials)
- The integration of environmental protection in the bioenergy field develops into basic principle for China
- Compared to 12th FYP: increase of waste incineration, biomethane and biomass briquette technologies
- Biomethane takes main construction priority in new FYP (biomethane demonstration counties, innovative biomethane technologies, construction and optimization of industrial systems etc.)
Sino-German Alliance on Bio Natural Gas

Project Objective
Through the cooperation between German and Chinese companies to jointly build up bio natural gas demonstration projects in China, advanced BNG technology and management from Germany is introduced into the Chinese market, a long-term Sino-German BNG communication platform is established and the transformation and upgrading of the Chinese BNG industry is further promoted in China.

Estimated Budget
> 1.5 Mio. Euro 150万欧元

Implementation Time
3 years (2017-2020)

Implemented by
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
德国国际合作机构（GIZ）

Supported by
Federal Ministry for Economic Cooperation and Development (BMZ) 德国经合部 (BMZ)
Sino-German Alliance on Bio Natural Gas

Planned Project Content 项目内容

- **Technical Assistance and Demonstration Projects 技术支持和示范项目**
  - Development of 3-4 BNG demonstration projects as showcase projects
    建立3-4个生物天然气示范项目，以展示德国先进的技术、设备和管理。

- **Technical Assistance on Monitoring Systems 物联网监测系统技术支持**
  - Set-up of monitoring systems for verification of subsidies
    采用德国先进的监测方法学和设备，用于建立和运行国家级物联网监测系统，以用于日后核准后补贴。

- **Capacity Building 能力建设**
  - Development of capacity building events (trainings, workshops, study tours).
    开展一系列的能力建设活动，包括组织针对各个利益相关方的培训、研讨会以及出国考察。

- **Policy Support 政策支持**
  - Development of a new policy system (output-based subsidies).
    开发针对生物天然气项目的后补贴支持政策，以提高工程的长期运行收益而不是短期投资支持。

- **Long-term Sino-German BNG Plattform 构建中德企业长效合作机制**
  - Development of a long-term cooperation platform.
    通过示范项目，建立中德生物天然气企业间富有成效的合作机制，建立长效交流平台以促进未来的合作。
Content

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Engagement in Developing and Emerging Countries 2012 worldwide

- Official development assistance (ODA)
- Foreign direct investment

126 Billion USD
Collaboration: Private sector and development cooperation

Private Sector objectives

Development Cooperation objectives

EZ-Scout
Unternehmen, Chancen, Entwicklung.
Motivation / Trends in developing and emerging countries

- **Decentralized energy solutions driven by industry** – avoid energy black outs and high costs of importing fossil fuels
- **Environmental regulations** (waste water, municipal waste, agricultural waste, landfills, etc.)
- **Feed in Tariffs / Quotas / Tender / reduction of tariffs and taxes**
- **Biogas upgrading to Biomethane**
- **Lack of political framework and standards en relation to biogas** (safety, biomethane, licencing, fertilizer, etc.)
- **Establishment of National Biogas Associations!**
- **Importance of South – South cooperation** (technology, political framework, standards, etc.)
Institutions of the German Development Cooperation

**Technical Cooperation** (political and technical advice, Capacity Development/Training, Colocation of development workers & experts via: GIZ, CIM, BGR, PTB, as well as Sequa (education and training, business membership organizations))

**Financial Cooperation** and Promotion of private Investments via: KfW Entwicklungsbank and KfW IPEX-Bank as well as DEG (Dt. Investitions- und Entwicklungsgesellschaft)
GIZ - Energy Projects

GIZ energy projects worldwide: ca. 170

- Africa: 30 %
- Asia: 27 %
- Europe: 12 %
- Latin America: 18 %
- MENA region: 6 %
- Trans-regional: 7 %

Current projects
Some GIZ energy Programms with biogas components

- **Serbia:** Development of a sustainable Bioenergy market (BMZ, 2013-2017)
- **Mexiko:** Energetic use of urban municipal waste (BMZ, 2014-2018)
- **Brazil:** Diffusion of climate friendly Biogas Technologies (BMZ, 2013–2017)
- **Indonesia, Thailand, Vietnam, Philippines, Myanmar:** PEP Renewable Energy South-East Asia (BMWi, 2013–2018)
- **Powering Agriculture - Sustainable Energy for Food:** Regional (BMZ, 2015-2019)
- **Energising Development - ENDEV:** Regional (Multistakeholder, 2008-2019)
- **India, China, Brasil, Mexico, Morocco, South-Africa, Tunesia, Algeria:** Bilateral energy partnerships (BMWi, 2015 – 2018)
- **South-Africa:** South African-German Energy Programme – SAGEN (BMZ, 2015 - 2017)
- **Caribbean Community:** Support to institutional structures for the promotion of renewable energies and energy efficiency (BMZ, 2012 – 2016)
- **Grenada:** Programme on Integrated Adaptation Strategies in Grenada (BMZ, 2012 – 2016)
- **Indonesia:** Promotion of Least Cost Renewables in Indonesia, (BMUB, 2012 - 2018)
- **Vietnam, South Africa, Ghana, Colombia, Peru:** Wir holen die Welt nach Bayern und bringen Bayern in die Welt (Bavarian Ministry of Economic Affairs)
- **Central America:** Promotion of Renewable Energies and Energy Efficiency in Central America (BMZ, 2010–2017)
- **Costa Rica:** Support of Costa Ricas strategy of carbon neutrality as a model for low-carbon development (BMU, 2011-2015)
- **Albania:** Climate-friendly integrated Waste- and Recyclingmanager (BMZ, 2016-2019)
- **India:** Support to the National Urban Sanitation Policy (SNUSP) (BMZ, 2014 – 2017)
- **China:** Sustainable Urbanisation, Transportation and Energy (BMUB, 2016 – 2020)
- **Vietnam:** Support for the establishment of a renewable energy agency (BMU, 2010–2014)
- **Turkey:** Efficient and Climate-friendly Use of Animal waste (BMU, 2010–2014)
- **China:** Optimization of Efficient Biomass Utilization (BMZ, 2009–2013)
Support for biomethane/biogas projects in developing- and emerging countries

1. devleloPPP.de

2. Feasibility studies
https://www.deginvest.de/International-financing/DEG/Unser-Angebot/Förderprogramme/Machbarkeitsstudien/

3. Climate partnerships with the private sector
https://www.deginvest.de/International-financing/DEG/Unser-Angebot/Förderprogramme/Klimapartnerschaften/
**Kfw group: A bank with a wide array of functions**

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**Promotion of environmental and climate protection**

| KfW | KfW IPEX-Bank | KfW | KfW DEG |
Financings for Biogas Projects

Project structures and financing criteria

- Large plants (5-10 MW) for processing industry of agricultural products (e.g. meat, fish, milk production, ethanol, palm oil, fruit and vegetable processing)
- Several smaller systems (500 kW - 1 MW) of the same type (in terms of plant type, substrate, supply and purchase structure) at different locations in a country
- Substrate: organic residues and sewage (no energy crops), tested fermentability, other use for food production (e.g. as fertilizer or animal feed) is not carried out or remains
- Energetic use of biogas (heat / cooling, steam, electricity)
  - by the substrate supplier or reliable private customers (medium businesses in the area)
  - Feed-in (PPA)
- Substrate supplier is economically responsible (as a shareholder, owner, operator or through long-term supply commitment (take or pay) and has a real interest in the biogas plant
- Costs and reliability of logistics and qualified staff!
- Generation of CO2 certificates.
Support for entering new markets: Development Partnerships

- develoPPP.de was initiated by the German Federal Ministry for Economic Cooperation and Development
- Applications are open to German and EU companies, which want to invest or engage themselves in Developing or Emerging countries (OECD-DAC list)
- Execution organisations are GIZ, DEG und sequa.
- EU based companies, annual turnover of at least EUR 1 million, ten employees, three years of business operation
- Development Partnerships
  - are useful from the development policy and economic perspective, positive impact on the development of the partner country
  - can not be realised without public contribution
  - are not required by law
  - are jointly funded (max. 50% public contribution),
  - the private Partner has a commercial interest
  - the sustainability is ensured after the public contribution ends
Evonik and GIZ transfer skills and technology for the improvement of the efficiency of biogas. Evonik is an expert in producing polymer membranes to purify biogas to biomethane. Hollow fibre membranes are a new technology for biogas upgrading.

**Approach**

- Evonik will supply the equipment for demonstration. Biogas plant owners and original equipment manufactures will be trained to enable the Chinese biogas sector to adopt technology.
- The GIZ Sino German Project of Optimization of Biomass Utilization will provide the access to the Chinese biogas industry. Cooperation with the China University of Petroleum Beijing (CUPB)

**Expected impact**

- Selected biogas plants demonstrate the benefits from the application of the innovative fiber membrane technology.
- The awareness and acceptance of the technology in the Chinese biogas sector has increased.
- The output efficiency of biogas purification processes has been increased
Colombia: Chigorodó (in development)

Organic fraction of household waste (separately collected) banana waste, energy crops,

- **Input**: 13,000 – 15,000 tons waste /year
- **Digesters**: stirred tank reactors
- **Biogas – Production**: 2 millions m³/year
- **Installed capacity**: 500 kW el & 530 kW term

Source: GICON
Brasil: pig manure

Fotos: Archea Biogas


• Biogas Philippines Forum 9 – 10 October 2017, Manila, Philippines.
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Fachverband Biogas

12. – 14. Dezember 2017
NCC Mitte, Messegelände Nürnberg

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Weltweit größter Treff der Biogasbranche mit internationaler Biogas Fachausstellung

Aktuelle Informationen und Anmeldung:
www.biogas-convention.com
Conclusion

- Biogas upgrading to biomethane quality is a state of the art technology, practiced in more than 500 biomethane production sites worldwide.
- Biomethane and natural gas in the transport sector has still a lot of potential and its use can make important contributions to CO$_2$ savings.
- Importance of public policy (Feed-in Tariffs, biogas-upgrading bonuses, quota systems, tax reduction, CO$_2$ tax, renewable fuel quota).
- Climate funds for developing and emerging countries!
- Huge potential for biomethane use for industry with big amounts of biomass, vehicle fleet (palm oil, sugar cane, etc.).
- CNG - bridging technology vs. parallel technology to electric vehicles.
- **Know-how, standards and trainings are necessary**
- Lots of experience and know-how already available! **Worldwide partnerships!**
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