中欧合作开发环境友好技术和生物基产品：经验与建议

CHINESE AND EUROPEAN COOPERATION FOR ECO-FRIENDLY TECHNOLOGIES AND BIO-PRODUCTS: OUR EXPERIENCES AND PROPOSED MODULES

董仁杰

DONG Renjie

中国农业大学教授，生物能源环境科学与技术研究室主任

国家级生物质能科学与技术国际联合研究中心主任

农业部可再生能源清洁化利用重点实验室常务副主任

国家生物燃气高效制备及综合利用技术研发（实验）中心副主任

Professor and Head, Bioenergy& Environment Science and Technology, China Agricultural University BEST)

Director, National Center for International Research of BioEnergy Science and Technology (iBEST)

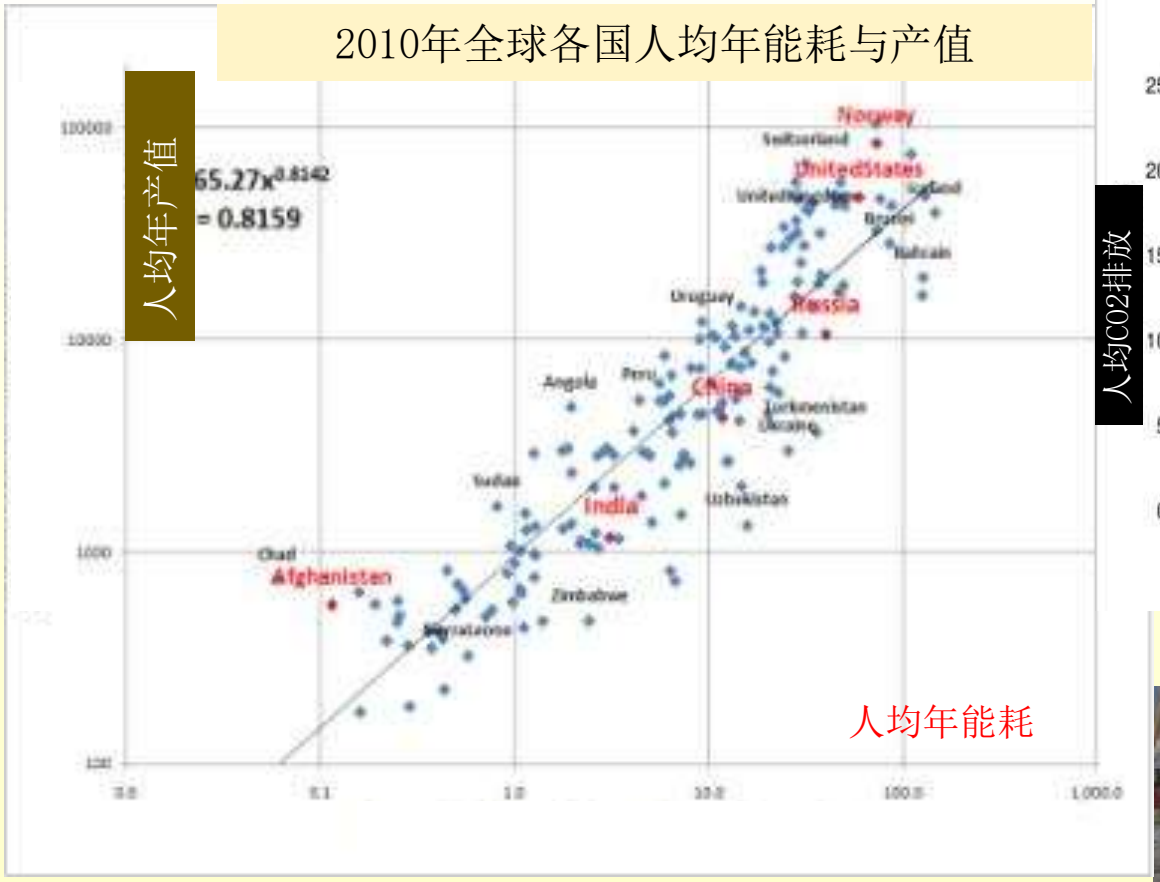
Executive Director, MoA Key Lab of Clean Production and Utilization of Renewable Energy (CPURE)

Deputy Director, State R&D Center for Efficient Production and Comprehensive Utilization of Biobased Gaseous Fuels (BGFuels)

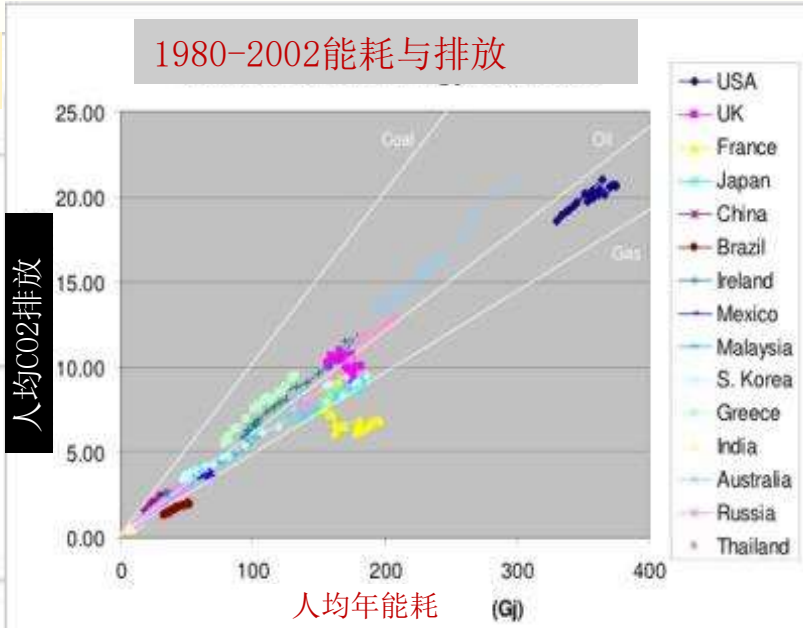
能源与环保是社会发展的基础

ENERGY/ENVIR. FOR DEVELOPMENT

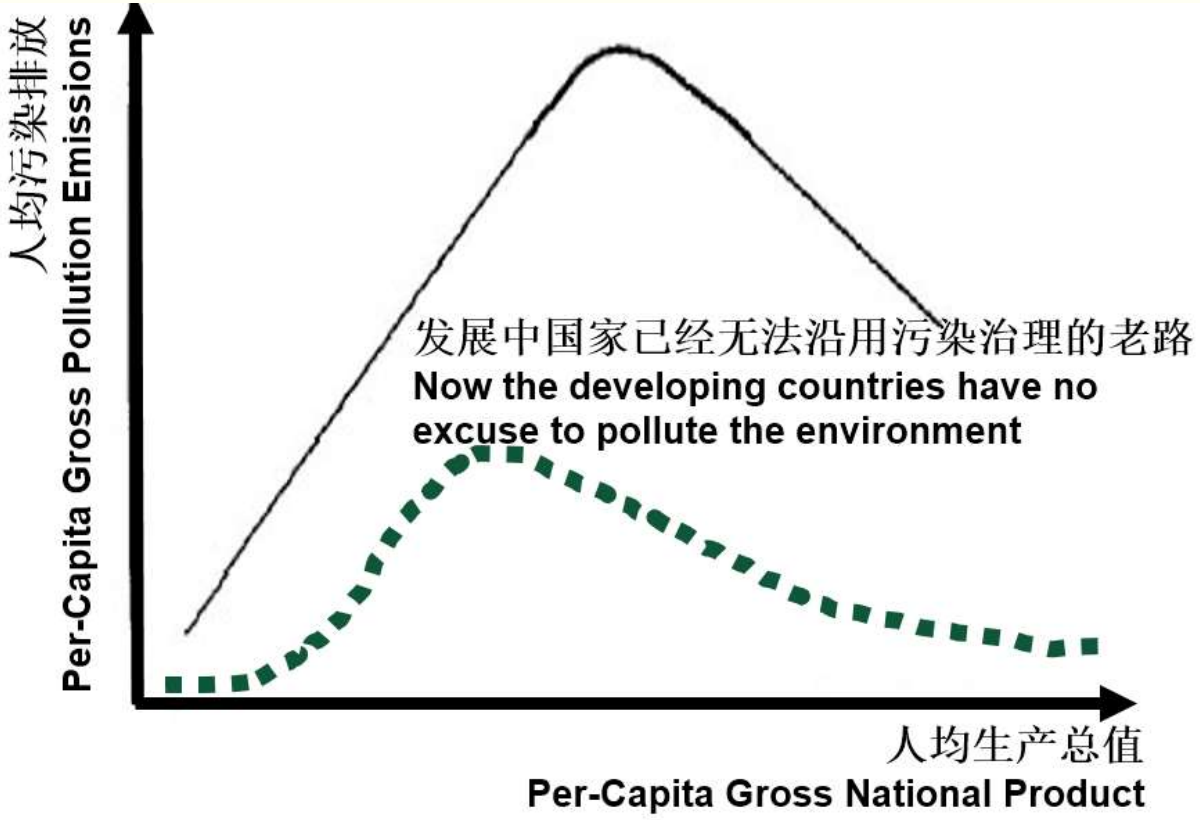
2010年全球各国人均年能耗与产值



1980-2002能耗与排放



环境友好的绿色发展是可持续发展的必然
ENVIRONMENT-FRIENDLY GREEN DEVELOPMENT IS KEY FOR SUSTAINABLITY



基于人均的生产与污染的倒U曲线（环境库兹涅茨曲线）

Hypothesized Productivity-Pollution Inverted U form on a per-capita base for a given nation as time progresses and development takes place (upper curve see: Arrow, et al. 1996 and Ayers, et al 2001; lower curve: new hypothesis by DONG based on communications) (Environmental Kuznets Curve-EKC)

农业绿色发展-环境友好技术、生物基产品
RURAL GREEN DEVELOPMENT: E-FRIENDLY TECHNOLOGIES AND BIOBASED PRODUCTS

- 资源节约技术（节省人力、减少投入品）
  Resource saving technologies
- 绿色投入品（绿色肥料、绿色农药、绿色兽药）
  Green input products
- 优质高产生物基产品（新品种、新工艺、新技术、新产品）
  High quality and quantity of biobased production
- 有机废弃物治理与循环利用
  Organic waste treatment and recycling
- 实现乡村振兴（政策体系、发展模式）
  Realize Rural Reactivation

中国国家战略
NATIONAL STRATEGY

- 2012年作出“五位一体”总体布局，把生态文明与经济、政治、文化和社会进步列为国家总体发展规划的五大目标之一。
- 2016年和2017年，中国政府先后提出农村能源革命和畜禽养殖废弃物处理和资源化，实施乡村振兴战略，实现产业兴旺、生态宜居、乡风文明、治理有效、生活富裕。

- Ecological Civilization along with Economic, Political, Cultural and Social progress as the five goals in the state development plan.

- Chinese government announced the strategy for Rural Energy Revolution and Agricultural Waste Resourcilization, and Rural Revitalization in 2016 and 2017 respectively

为什么养殖粪水都可能是沼液
WHY ANIMAL SLURRY IS AD SLURRY

普遍直接施用？ Direct Application to crop field?

养殖粪污
Manure

农业生产
Crop production

粪水
Manure Slurry

敞口 open

贮存Storage

农田利用Field Application

封闭air tight!

厌氧AD

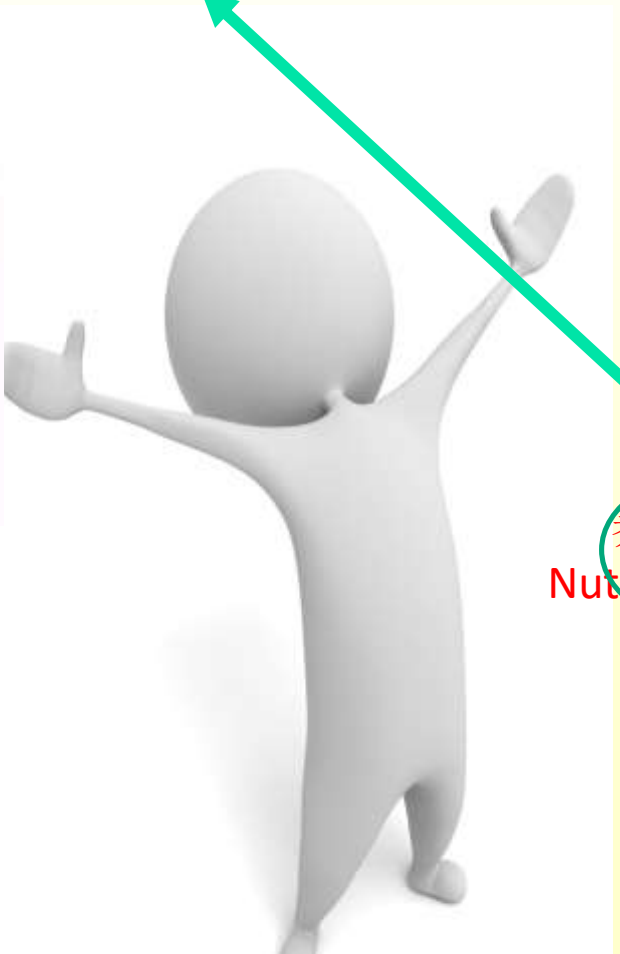
快速低成本
厌氧发酵
Fast and
Cheap AD

厌氧贮液塘
二次发酵塘
Secondary
Storage AD

沼液缓冲塘
Ready for
Application

种养结合是实现养殖废弃物利用的关键
MATCHING CROP-ANIMAL PRODUCTION IS CRUCIAL FOR ANIMAL MANURE T/R

种C



养分商品化
Nutrients Prod

种C 养A

合作经验：共享经验、互相借鉴
EXPERIENCES OF COOPERATION: SHARE AND LEARN FROM EACH OTHER

“大循环”合作平台

PLATFORM: GREAT CYCLE

生物质能工程与低碳技术研究室
BioEnergy Engineering and Low Carbon Technology Laboratory

董仁杰 教授
中国农业大学国际合作与交流处处长
农业生物质工程中心常务副主任
农业部可再生能源清洁化利用重点实验室常务副主任
北京市海淀区清华东路 17 号

Prof. DONG Renjie
Director, International Relations Office
Executive Director, Biomass Engineering Center
Executive Director, MoA Key Laboratory of Clean Production and Utilization of Renewable Energy (rm 301-308)
P.O. Box 184, China Agricultural University, 17 Qinghuadonglu, Haidian District, Beijing 100083, People's Republic of China
Tel: +86 10 6273 7885/7693 Fax: +86 10 6273 7885/7704 Email: rjdong@cau.edu.cn

Proposal for “World Platform of the Great Cycle: Nutrients and chemicals, Energy, and Water from Biomass Feedstock (Great Cycle Platform) ”

At the occasion China Agricultural University and Wageningen University and Research Center (WUR) to build a strategic partnership, a worksho (from Sep. 26th to Sep. 30th, 2013) with the theme of zero pollution making Renewable Nutrients, Energy, and Water from any kind of organi liquid and solid wastes is held in China Agricultural University. An invite world well-known delegation of international representatives fron corporate, academic, and governmental institutions, as well as faculties and graduate students of Biomass Engineering Center of China Agricultural University experienced the whole event. As a result o discussions regarding the current status and future prospects of bioenergy in China, we, the attendees, propose an open platform, entitled “Worl Platform of the Great Cycle: Nutrients and chemicals, Energy, and Wate from Biomass Feedstock (Great Cycle Platform)”.

	Signature
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oenergy	
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3) Jointly explo

4) Provide cons

Themes:

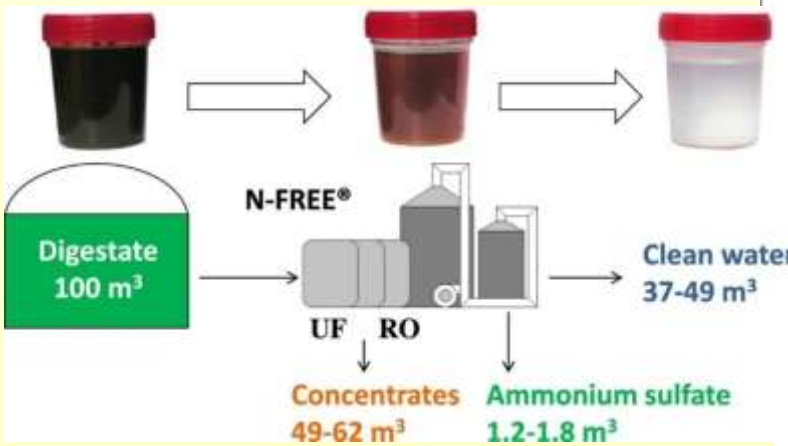
(1) To maintain
government
involved in
information
(2) To cooperati
bio-energy
(3) To streamlin
projects;
(4) To organize
(5) To create tra
various inst
programs a
(6) To create a w

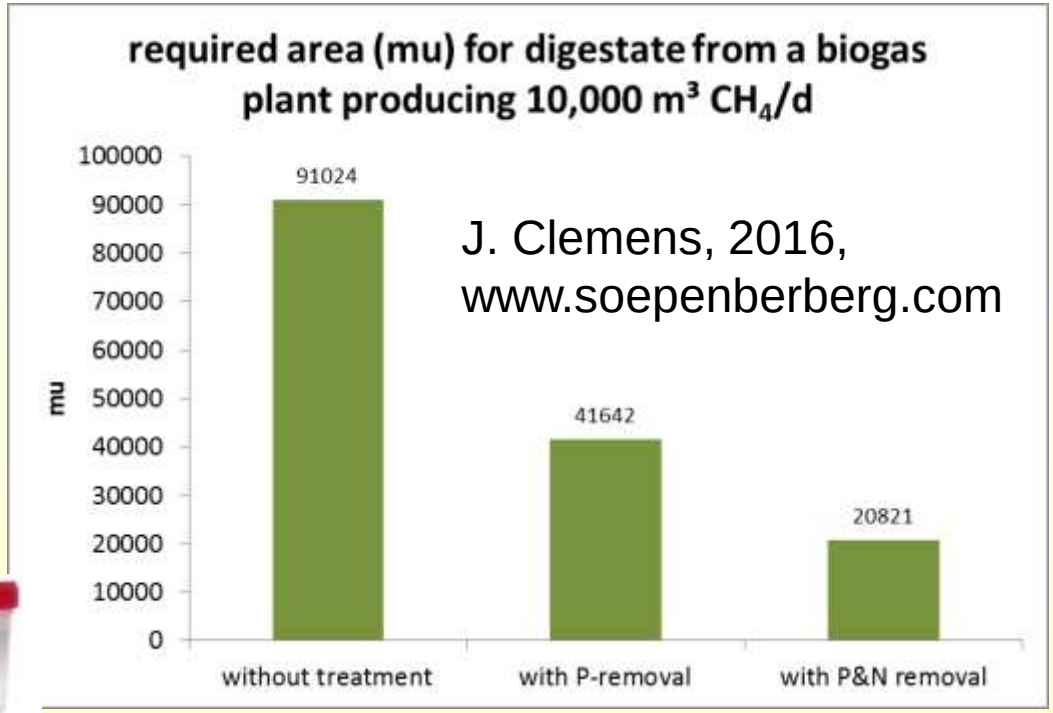
Structur

All member ind
will be operated
Administration
Honorable Boa
Secretaries. Th
member country
Quarterly Great
country rotates
on the interest
members.

减少养分含量实现沼液“减量”
REDUCE BIOGAS SLURRY BY NUTRIENTS RECOVERY

F. Adani：每100吨沼液可以回收1.8吨了浓缩硫酸铵。
Fab. 1.8 tons of (NH4)2SO4 harvested from every 100 tons of biogas slurry.





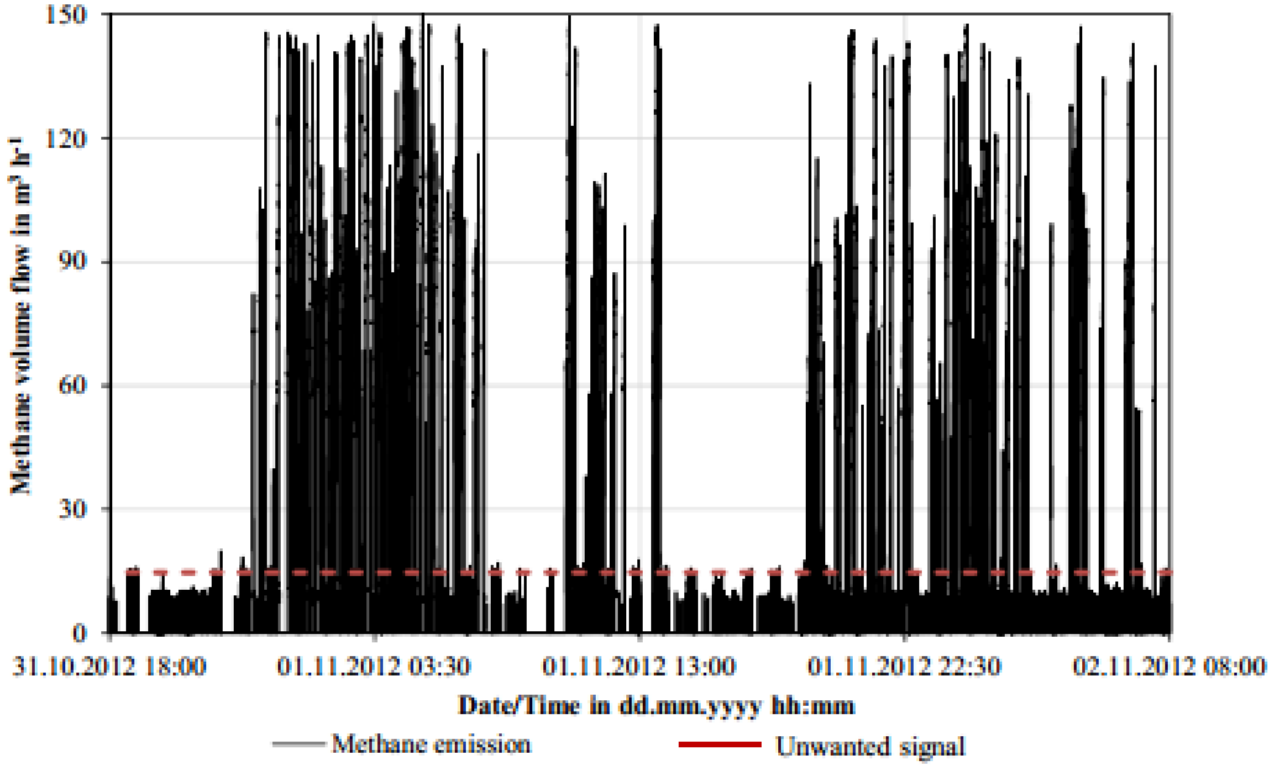
Base of calculation: Demand of nutrients: 22.5 kg N/(mu a)**; 3.7 kg P/(mu a)**; 12.800 LU produce 1,400 kg DM/(LU a)*; 1 kg DM produces 12 m³ CH_4 ***; 1 LU= 500 kg, P-removal 80%, N removal 50% (Data from Schuchard et al. 2012*, according to Roelcke 2016**, database Lfl***)

沼气工程泄漏
MONITORING OF BPS METHANE LEAKAGE

Introduction
Methods
Results and Discussion
Outlook

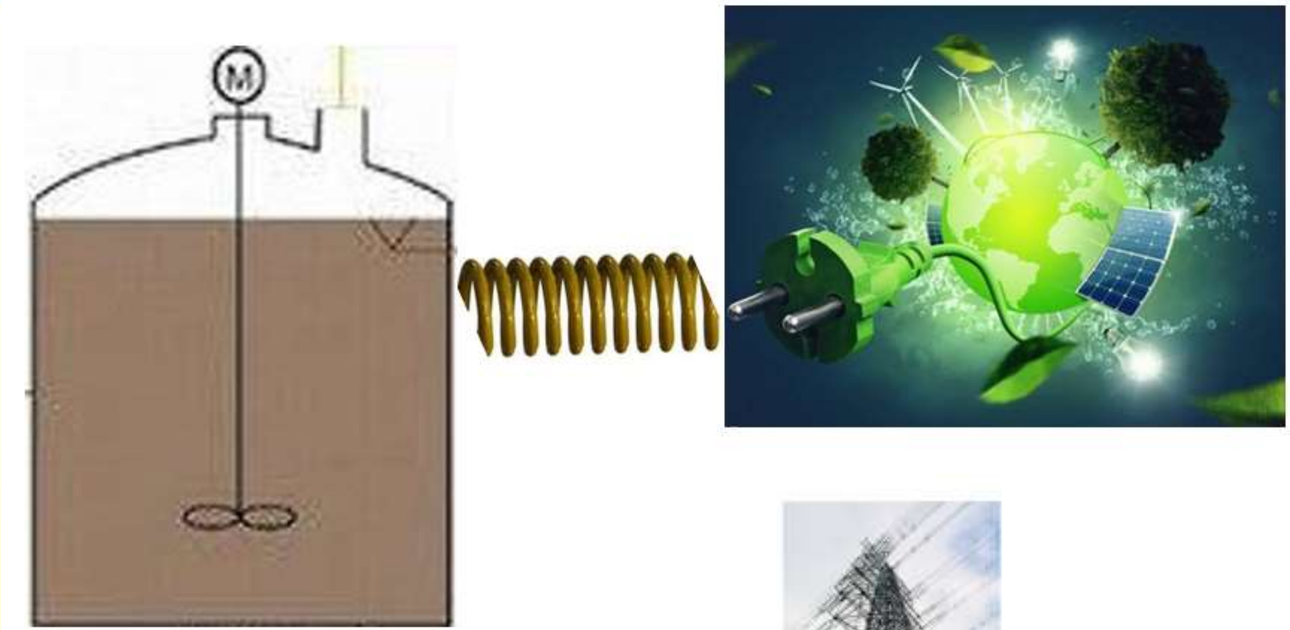
DBFZ

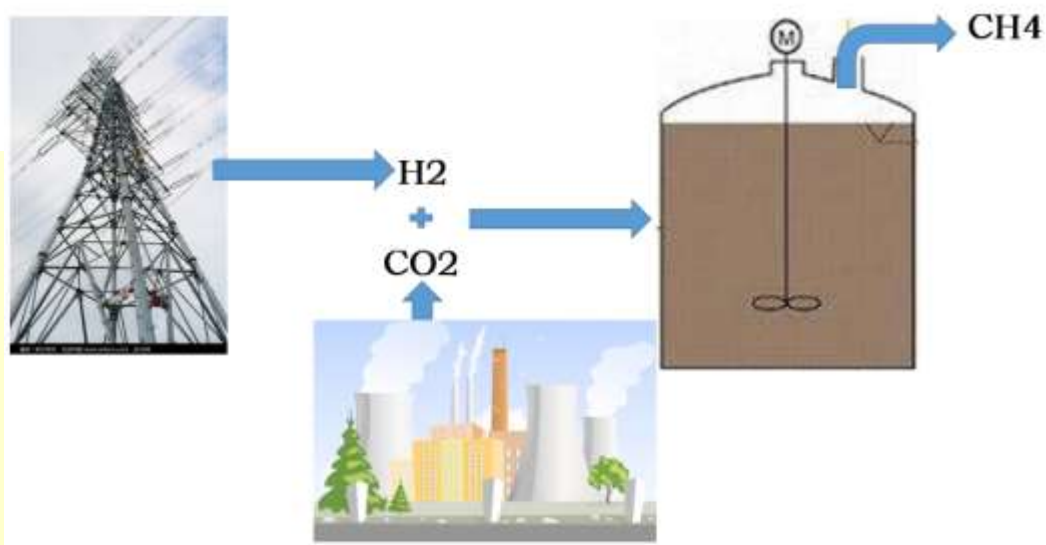
Results and Discussion
PRV – Plant A



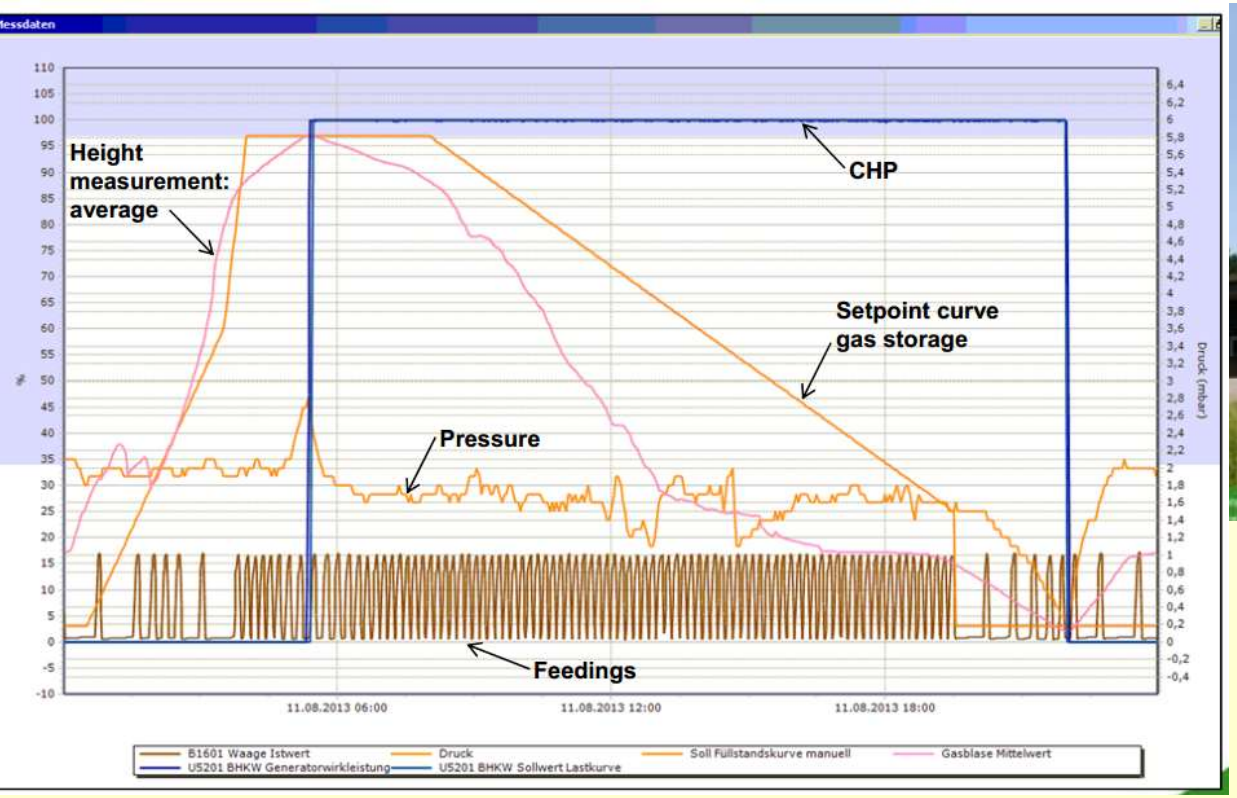
Graphic modified from Westerkamp, T., Reinelt, T., Oehmichen, K., Ponitka, J., Naumann, K. (2014): KlimaCH4 – Klimaeffekte von Biomethan (Climate effects of the biomethane economy, DBFZ Report Nr. 20). Report language: German. DBFZ, Leipzig. ISSN 2197-4632.

生物甲烷-易贮存可输送的可再生能源
BIO-METHANE: TRANSPORTABLE/STORABLE





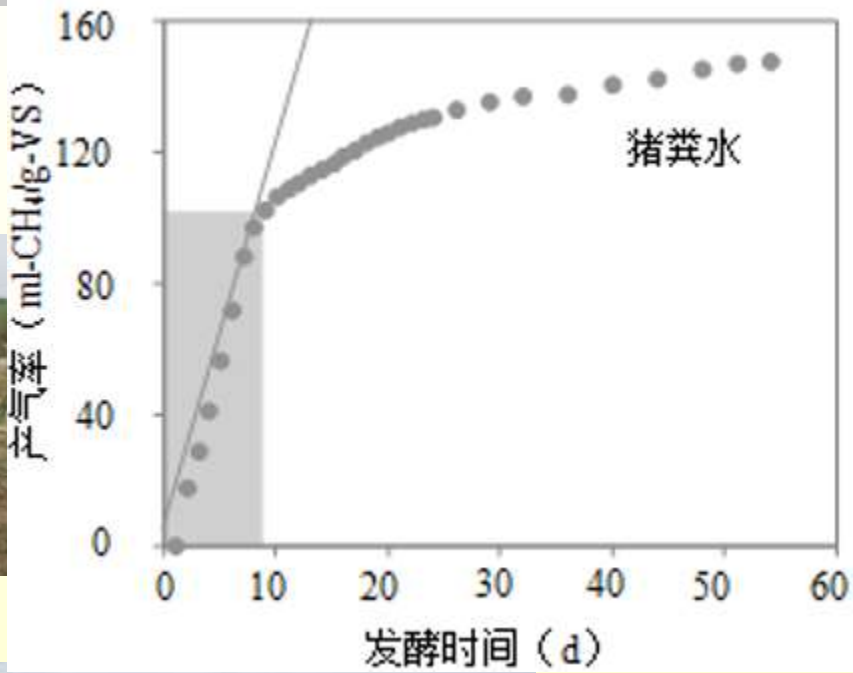
按需定产
POWER ON DEMAND



Second generation → "Feedcontrol flexible":
Feeding frequency according to the required demand of biogas

Calculation is based on
- gas storage (inflated air roof with height measurement)
- load profile (CHP)
- substrate quality

针对液态粪污研发适宜的厌氧反应器
NEW AD FOR MANURE SLURRY



养殖场废气处理
BIOFILTER WITH HIGH METHANE OXIDIZATION

gewitra

Ingenieurgesellschaft für Wissenstransfer GmbH (gewitra)

Beijing United Pioneer Environmental Engineering Co., Ltd

China Agricultural University (CAU)

Project Cooperation Agreement

"Biofilter with high methane oxidation efficiency in agriculture and waste treatment sector"

Beijing · China

2013 July

国家国际科技合作计划

项目建议书

项目名称：农业源废弃物处理废气低浓度甲烷的高效氧化生物过滤技术研究示范

合作国别：德国

项目组织(推荐)部门（盖章）：科技部

中华人民共和国科学技术部

二〇一一年一月 制

固液分离/好氧生物处理
S/L SEPARATION AND AEROTION

组合式城镇能源环保中心

*I*TEEC-INTEGRATED TOWN ENERGY AND ENVIRONMENT PROTECTION CENTER

地平线项目与中国国际科技合作项目
HORIZON 2020 / CHINA-EU COOPERATION

地平线项目与中国国际科技合作项目
HORIZON 2020 / CHINA-EU COOPERATION

Annual announcement to cooperate with individual countries.
2018 2nd term of call for international cooperation
Fenland, Italy, and Czech on topics with bioenergy and environment protectio

国家重点研发计划政府间国际科技创新合作.doc
科技部关于征集2016年度中国与匈牙利政府间科技合作项目建议的通知.docx
科技部国际合作司关于征集中国—匈牙利科技合作委员会例会交流项目的通知.docx
首个中国—中东欧国家农业合作示范区在索非亚揭牌.docx
中德作物生产与农业技术示范园项目签约仪式在南京举行.docx
中法核电合作：从双赢到携手走向世界.docx
中华人民共和国政府和保加利亚共和国政府联合公报.docx
中华人民共和国政府和大不列颠及北爱尔兰联合王国政府联合声明(.docx

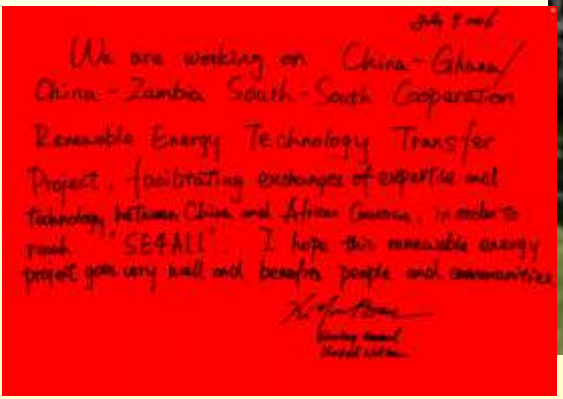
中国芬兰：智慧和柔性能源
中国意大利：生物质转化为能源；和其他附加值产品的创新过程
中国捷克：能源科学技术（包括新能源发展、 清洁煤利用、 可再生能源利用等）；环境科学技术（包括环境保护工程、 水资源管理等）

中国+欧洲+非洲
ChinAfriEu

联合国开发计划署
斯里兰卡-中国-埃塞俄比亚沼气和太阳能三方合作
农业产业转型使用可持续能源

SRI LANKA - CHINA- ETHIOPIA BIOGAS AND SOLAR TRILATERAL COOPERATION:
TRANSITIONING TO SUSTAINABLE ENERGY USES IN THE AGRI-INDUSTRY

中国商务部-联合国开发计划署
MOFCOM-UNDP
China MOST | Ethiopia MoWIE | Sri Lanka SEA
中国农业大学 China Agricultural University



July 9, 2016. Former Secretary General of the UN, Ban Ki-Moon praised the China-Ghana/ China-Zambia Renewable Energy Technology Transfer Project and China's constructive contributions in renewable energy development and wrote down his best wishes for the project.

中欧合作建议模式
COOPERATION MODULES

- 乡村发展研究，使中国乡村振兴发展得更快更好

Studies on Rural Reactivation, promote China Rural Reactivation right on the fast track

- 有机废弃物处理利用研究，使中国农村生态文明建设更快更好

Studies on organic waste treatment and recycling, promote China Rural Ecological Development right on the fast track

- 建设中欧和中国与欧洲各国联合研究中心和示范基地，使产品和技术市场化

Develop China-Europe and European countries Joint Research Centers and Demonstration Stations, Transfer the technologies and products innovations into market

- 多国合作应对共同挑战（如2050年农业预测）

Team-up for common challenges (e.g. Agriculture in 2050)

- 中欧合作，援助非洲，造福世界

Support Africa through China-Europe cooperation and make the whole planet a better future

展望未来

IMAGINE THE FUTURE

谢谢

THANKS FOR YOUR ATTENTION

+86 13601387967

rjdong@cau.edu.cn