FACH HOCHSCHULE LÜBECK
University of Applied Sciences

# Training for Biogas Design Institutes: International Best Practice Middle-Large-Scale Plant Technology Planning and Design II

## - Education of Biogas Professionals –

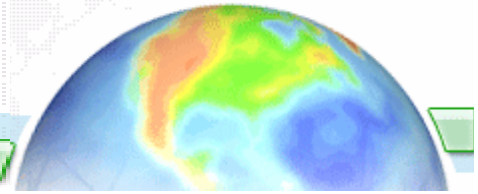
## 沼气职业培训

**Prof. Dr. Michael Bischoff**

Location : Beijing

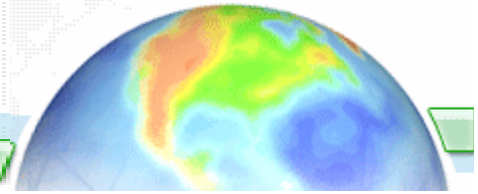
16.05.2010

# Overview



- Welcome and personal introduction
  自我简介
- Biogas Professionals
  沼气专业化
- The Dimensions of Biogas Technologies
  沼气工程技术范围
- Knowledge Fields of Biogas Professionals
  沼气专业化的相关知识
- Aspects of Education and Training
  培训领域范围
- Education of Biogas Professionals
  沼气专业化培训
- Integration of the Exchange  of Scientists
  专家交流组织一体化

# Welcome and personal introduction
# 自我简介



- Introduction and Personal Work Fields at Luebeck University of Applied Sciences (LUAS)

  Luebeck 应用科学大学，教学和研究

  Laboratory for Air Pollution Control 空气污染试验研究

  Laboratory for Environmental Process Engineering, inc. Biogas Processing 沼气处理过程试验研究

  China Cooperation 中德合作

  Engaged in a joint Sino-German Study-Program Environmental Engineering (with ECUST)

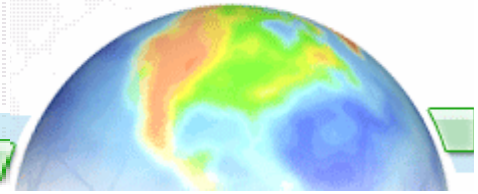
  Hosting and Training of Design Institute Members in Collaboration of Province Schleswig-Holstein and Zhejiang Province

  CATE-B -Project: Exchange of Young Scientists on Biogas for the promotion of small and medium size facilities in rural areas of China (with ZJU, ZJUT, ECUST, TU HH, HSU, LUAS)

FACH HOCHSCHULE LÜBECK
University of Applied Sciences

DEUTSCH-CHINESISCHES Jahr der Wissenschaft und Bildung 2009/10

# Biogas Professionals
# 沼气职业化



- Definition 定义
  - Experts dealing with complex technical, organizational, legal, and social/environmental issues of planning, design, construction, operation, and authorization of biogas plants

    专家对于沼气工厂内复杂工艺，组织，法律，社会和环境问题的设计，建设和操作
- Application fields e.g. 应用领域
  - Design Institutes 环境科学研究院
  - Plant designers and builders 工厂设计和建设者
  - Plant operators (e.g. at operator models) 操作人员

# Biogas Professionals
# 沼气专业化

- Basis 基础
  - Technical Knowledge as e.g. Environmental Engineers, Mechanical Engineers, Process Engineers etc.

    工程知识，例如环境工程师，机械工程师，过程控制工程师
- Further Qualification 其他领域
  - Biogas specific Theory and Technololgy 沼气特殊领域内的理论和技术
  - Practice oriented Skills 实践技术
  - Abilities for Complex Engineering Responsibilities 复杂工艺上的研究
  - Ability to deal with actual problems and questions of biogas processing and usage

    处理实际问题和沼气处理和使用上的问题

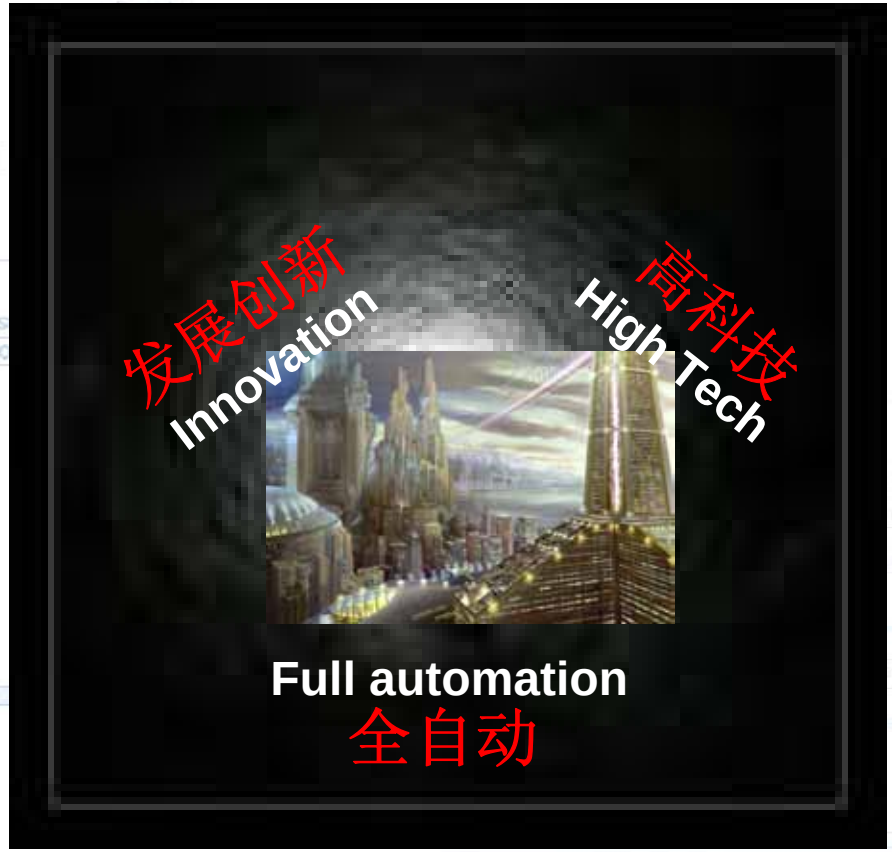
# Dimensions of Knowledge for Biogas
# 沼气知识的领域范围

- Problem: Technology Centering 问题：技术核心

Engineer's Tunnel vision

# Dimensions of Knowledge for Biogas
# 沼气知识的领域范围

- Problem: Technology Centering 问题：工程技术核心



# Dimensions of Knowledge for Biogas
# 沼气知识的领域范围

- Actual outlying demands for success 成功操作的基本要求

Control Options 控制选择

Information and communication 信息和交流

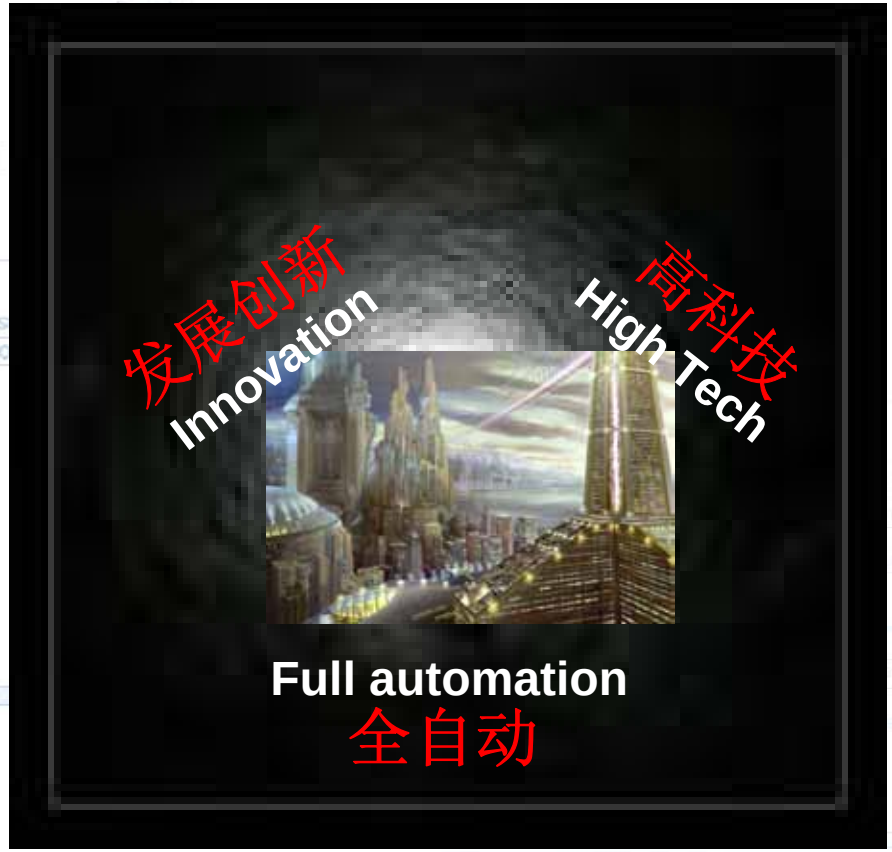
Personal Engagement 责任问题

Practical Experience 实践经验

Economy in short and long term 短期和长期的经济问题

Logistical aspects 逻辑问题

Social aspects 社会因素




Motivation and Incentives 动力

Human failure potential 认为因素的过失

Governmental Framework 政府的框架工程

Maintenance 维护

Organization 组织

Infrastructure 基础建设

Frustration tolerance 过失承载力

# Dimensions of Knowledge for Biogas
# 沼气知识的领域范围

## Dimensions of Technologies 技术领域

### Function 作用

Technology is designed to fulfill a demanded function

### Sustainability 可持续性

Technology shall assure an economical lifetime function respecting developing side effects (development of environmental, economical and social framework conditions)

### Integration 一体化

Technology shall be designed to fit into social and technical framework

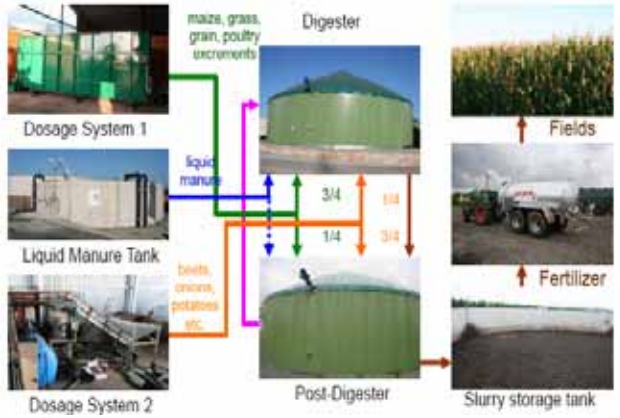
### Manageability 管理能力

Technology must supply transparency and indicators for control and evaluation of its performance (technically, economically, socially, ecologically)

# Knowledge fields of biogas professionals
# 沼气专业知识领域

- Technology 技术
  - Biology, incl. 生物学
    - Biochemistry
    - Fermentation
    - Substrates and Co-Substrates, Inhibitors and promoters
    - Analytics

  - Basic and Detail Process Engineering incl
    过程工程的基础和细节.
    - Control Systems and Automation
    - Safety and Security
    - Facility Design, incl.
      - Controls, Instruments and accessories
      - Construction Materials




  - Biogas Utilization incl. 沼气应用
    - CHP
    - Biomethane etc.

  - Plant Operation and Maintenance 工厂操作和维护
  - Repowering/Reengineering of Existing Plants 现有工厂的创新和改进

# Knowledge fields of biogas professionals
# 沼气专业化知识领域

- Management - Legal Aspects 管理-法律问题
  - Basic regulations incl. 基础管理
    - Waste legislation, energy legislation, fertilizer legislation regulations, building legislation, veterinary legislation, sa requirements
  - Approval Procedures and institutions 许可和组织
  - Contracting 合同
  - Liability, insuring, tax issues 责任，确保和税务问题
  - Legal Responsibility 法律责任


- Management – Economy 管理-经济问题
  - Economic Framework of Biogas Plants
  - Practical economic calculations for Biogas Plants 沼气厂的实践经济计算问题
  - Funding and Financing of Biogas Projects 沼气工程的经济问题
  - Project Management Skills for Designers and Operators 设计和操作者的项目管理技术
  - Clean Development mechanism (CDM) 清洁发展机制

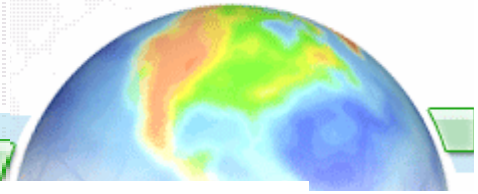
# Knowledge fields of biogas professionals
# 沼气职业化知识领域

- Management – Environment and Security
  管理-环境和安全问题
  - Security conceptions 安全性理念
  - Emergency Plans 紧急事故应急设计
  - Emission Control 排放控制
- Source and Substance Management
  原料和物质管理
  - Source Aspects of Substrates and Co-substrates 原料问题和混合发酵
    - Farm Operation, Energy Plants and Requirements, En
      Mixing and Adjustment of Substrates, Additives
  - Heat and energy management 加热和热能管理
  - Aspects of biogas manure 沼气粪肥问题
    - Liquid residues, solid residues
  - Biogas Treatment 沼气处理

# Knowledge fields of biogas professionals
# 沼气职业化知识领域

- Aspects of Integration and Sustainability 一体化和可持续性发展
  - Collaboration of Plant Designers, Operators and public authority 设计，操作和公众的合作
  - Biogas and Publicity – Problems and Solutions 沼气和宣传-问题和解决
  - Social Awareness 社会意识
  - Maintenance organization and control procedures 维护组织和控制问题
  - Work and operating instructions 组织操作运行
  - Evaluation of Plant Performance (key indicators) 工厂运行情况的评价（核心）
  - Life Cycle Conclusions 生命周期总结

# Aspects of Education and Training
# 教育培训领域



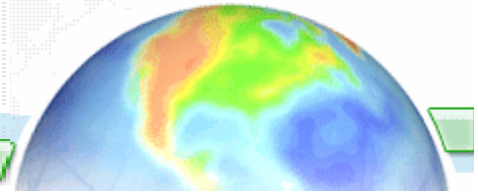
- Elements of Education e.g.因素
  - Theoretical Fundaments 理论基础
  - Laboratory Experiments 试验研究
  - Process Modeling 过程模型
  - Practical Work on Biogas Plants 实践经验
- Suited learning situations e.g. 适宜的学习环境
  - Classical Lectures 经典课程
  - Interactive Group Works (e.g. with experts from practice) 组织合作
  - Case Based Learning - Learning with practical questions 基础学习-实践问题
  - Workshop Training (Approach of Apprenticeship) 培训问题
  - IT supported simulations IT业的支持

# Education of Biogas Professionals
# 沼气职业培训

- Potential Study Program for Biogas Professionals
  沼气专业化学习程序
  - Basis: Engineering bachelor (e. g. environmental engineering)
    基础: 本科
  - Upgrade: Practical oriented Master program including an apprenticeship and deep theoretical approach
    其次: 实践领域的硕士研究，包括学期和深入的理论实践方法
  - In cooperation of German and Chinese Partners
    中德专家合作

# Integration of Scientific Exchange

# 专家团队一体化



- CATE- B

Sustainable Partners – Partners for Sustainability: Biomass processing from animal farms for the development of weak infrastructural regions in China – China applied technologies

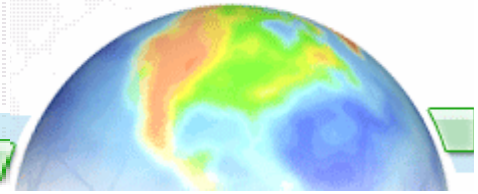
持久的伙伴-中国基础建设发展过程中动物农场生物质处理转化-中国应用技术

Project funded by German **Robert Bosch Foundation.**

Target: An extensive exchange of expertise and young researchers of both the German and Chinese to develop strategies and technologies for small and medium sized plants for weak infra-structured areas in China.

目的是广泛交换经验，以及中德间小中型工厂基建领域内的发展策略和技术

# CATE-B



## ❖ Current Project Partners
现有合作伙伴

TUHH
Technische Universität Hamburg-Harburg

Institut für
Umwelttechnik und
Energiewirtschaft
IUE

aww
Institut für Abwasserwirtschaft
und Gewässerschutz

FACH
HOCHSCHULE
LÜBECK
University of Applied Sciences

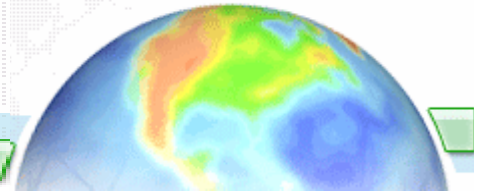
ZHEJIANG UNIVERSITY

School of Biosystems Engineering and Food Science

HELMUT SCHMIDT
UNIVERSITÄT

EAST CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY

College of Biological and
Environmental Engineering
Zhejiang University of Technology



Thank you for your kind attention

谢谢您的关注！