Commercialization of Biogas Technology

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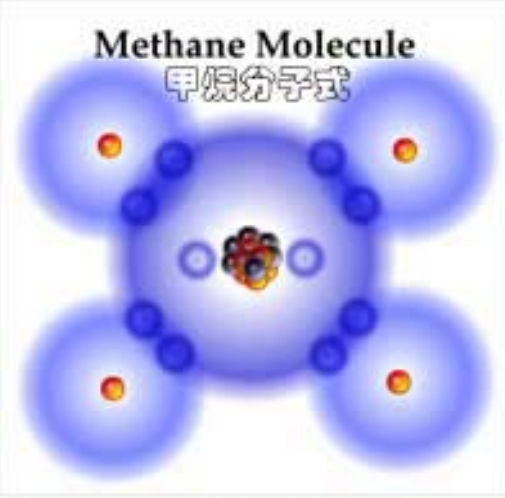
Wang Lijing、 Liu Yuan、 Wang Bingjie

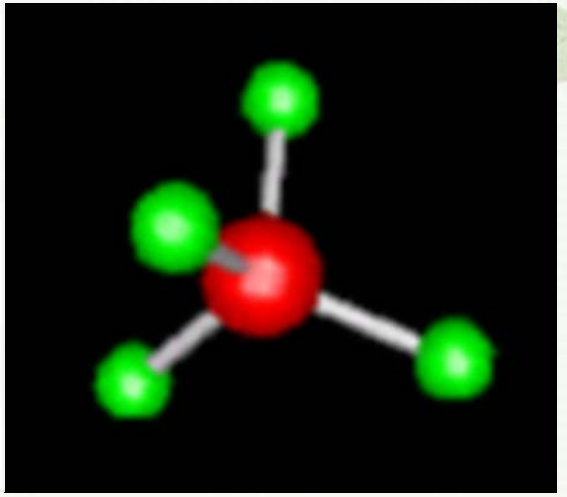
Bell & us

BIOGAS

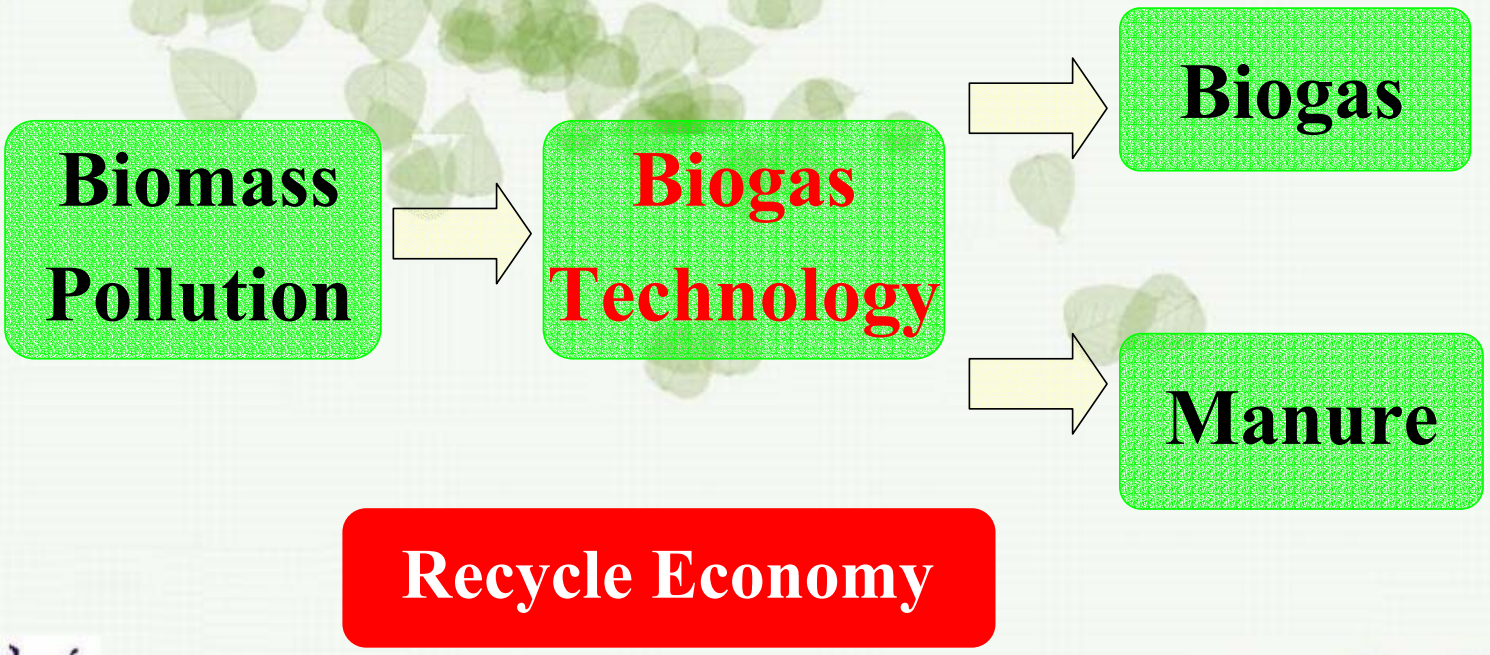
Biogas, contains CH4、CO、N2、CO2、H2S etc.

Methane is its main component, 50~80%





Biogas Technology



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- Status quo of biogas application
- Barrier to biogas commercialization

  & our suggestions
- Marketing Mode of Biogas commercialization
- Case study on biogas commercialization

  ——Danish biogas project

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- Status quo of biogas application
  - **Family-use biogas （Liu Yuan）**
  - Biogas engineering for scale livestock and poultry farms
  - Industrial biogas
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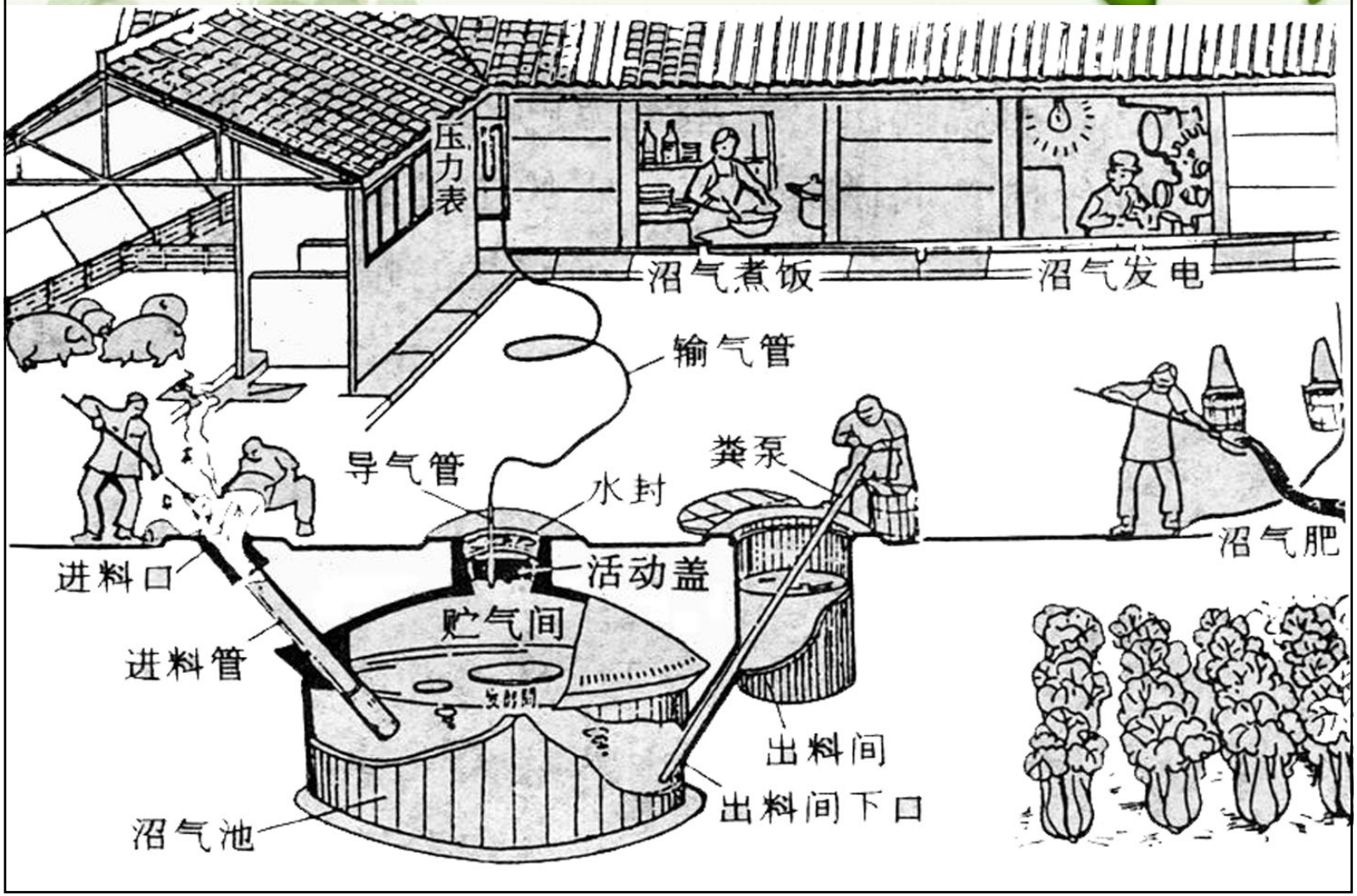
Family-use biogas

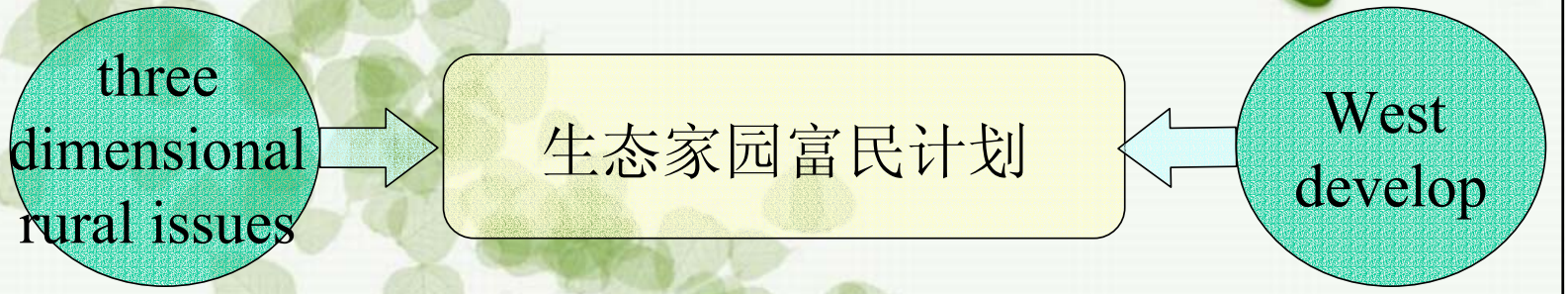


Family-use biogas

- In 1958，Chairman Mao inspected the usage of biogas , after that there was a short upsurge.

- In 1970s, owing to lack of living fuel in country, China government spread the Family-use biogas, but not succeeded.

户用沼气现状



- In 2000，China government invests 400 million yuan.
- In 2003，national debt for country biogas start up, 1billion yuan. Cover 1 thousand counties, 1.7 million family will get profit

The meaning of family-use biogas

- Increase farmers' income
- Protect environment
- Adjust agricultural structure
- Improve farmer's living condition

Problem in the development

- Supervision and management
- Financing limit
- Country market economy limit
- Technical limit

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Background and Necessity of Biogas Engineering Development for Scale Livestock and Poultry Farms

Start-up of "Town Basket Project"

Scale of livestock and poultry farms becomes larger and larger

problems of environment pollution

water, air, soil, crops,
and the health of human being

Other social and economic impacts

pollution disputes between farms and their neighborhoods;
Doing harm to livestock and poultry breeding industry

Implement of relative policies

- State environmental protection administration united ministry of agriculture to bring the following policies into effect.

  - ✓ **《Management method of preventing and curing pollution for livestock and poultry breeding》**
  - ✓ **《Technical standard of preventing pollution for livestock and poultry breeding 》**
  - ✓ **《Letting standard of pollutions for livestock and poultry breeding 》**

- **The compulsive function of the laws pushes the development of biogas engineering for scale livestock farms..**

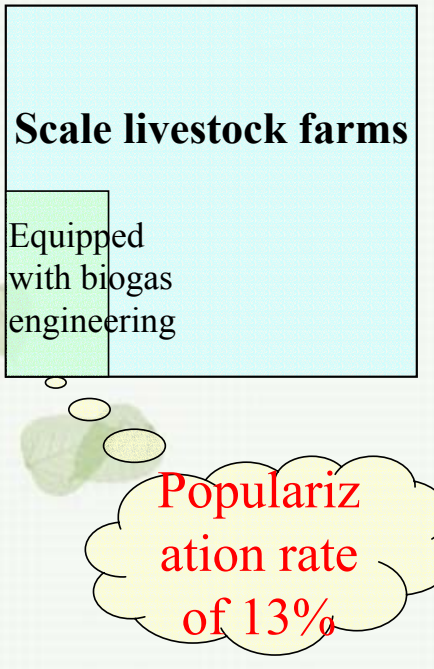
Advantages of anaerobic techniques

- Anaerobic techniques v.s. aerobic techniques:
  - High efficiency(removing 80 to 90 percent of organic compounds)
  - Special ability for decomposing some substances
  - 5 to 20 percent of dirty mire produced by aerobic techniques.
  - Low energy cost
  - High energy conversion rate of 87%
  - Usefulness of by-products

Popularization of biogas engineering for scale livestock and poultry farms

There is more than ten thousand scale livestock farms now in China and 1351 anaerobic waste water disposal engineering, distributing in 24 provinces .

- Having a total capacity of near 42.5 ten thousand cubic meters and producing 1.23 hundred million cubic meters of biogas annually which supplies 11.9 ten thousand families for fuels ,disposing 2786.8 ten thousand tons of ordure and organic waste water.
- Biogas power plants have been built in 9 provinces ,but electricity is mainly used by themselves.



Obstacles of commercialization(1)

- Low profit（main obstacle）
  - Market demand
  - Extension of industry chain
  - Scale of livestock farms
  - Policies environment
- Limitation of techniques
  - Some key equipments
  - Demand of automatization
  - Special bacteria

Obstacles of commercialization(2)

- Imperfectness of service system
  - Having no uniform technical criterion
- Being short of raw material
  - Small scale of livestock and poultry breeding industry

There is more than ten thousand all kinds of scale livestock and poultry farms，only 9 to 43 percent of total amount of livestock and poultry around China.

Obstacles of commercialization(3)

- Financing problems
  - Financing evaluation fail because normal financing evaluation method neglects social and environmental benefits
- Being short of information spreading channel

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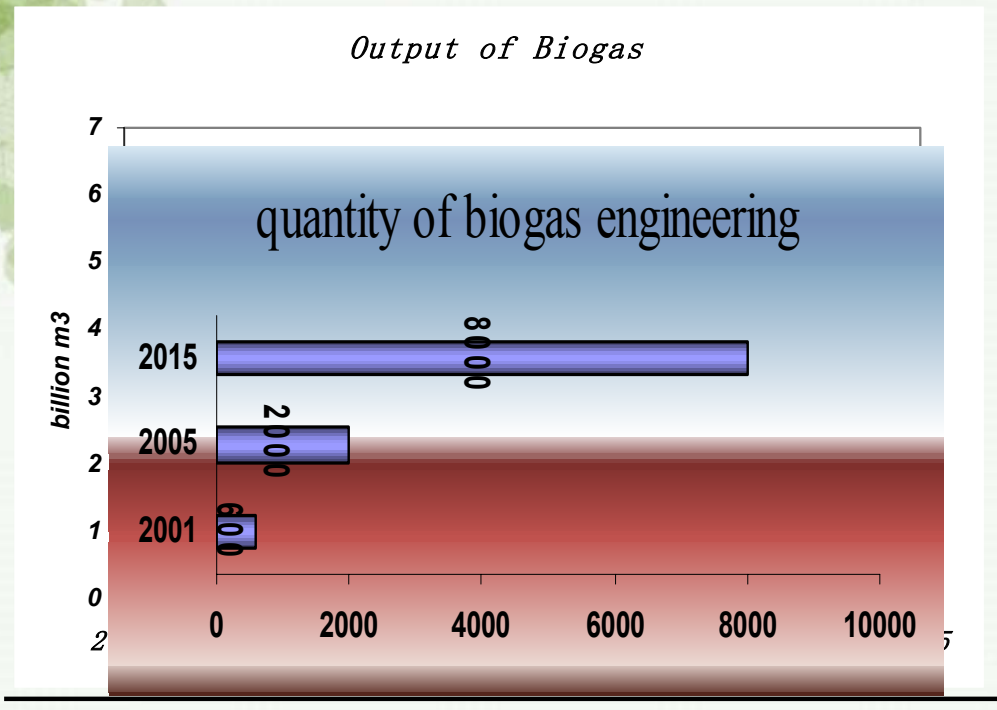
Industrial Biogas Development

Breakthrough	The first industrial biogas project was born in 1936
Model	The first large-scale industrial biogas project was born in 1964
Development	In 2001,there are more than 600 industrial plants which can produce 1 billion m^3 biogas
Trend	

Industrial Biogas Development

- Breakthrough
- Model
- Development
- Trend



The Potential of Industrial Biogas

Wastewater: 2.52billion m^3 /a
Residue: 74million m^3/a

Biogas:10.8billion m^3

8 million tons coal

Downstream Products:
(biogas、
organic fertilizer etc.)

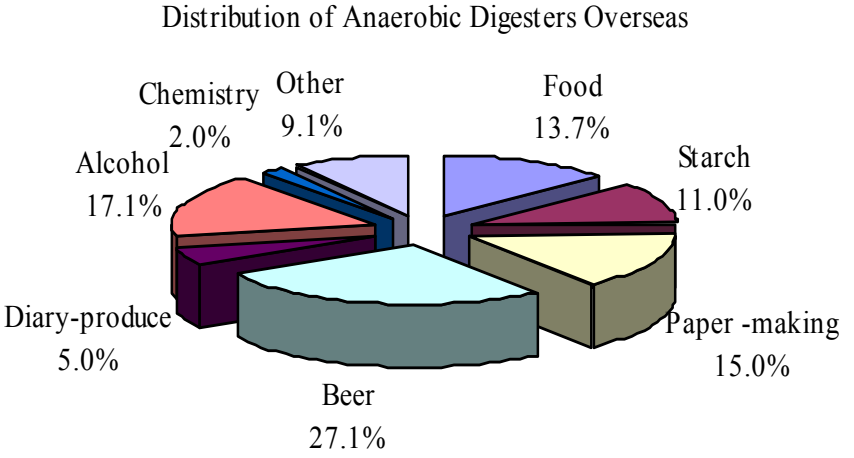
New industrial chain

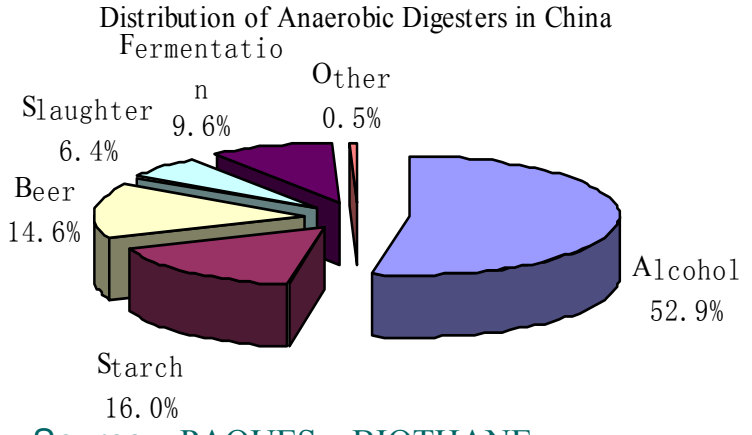
Jiuchang Distillery Biogas Project

- **Investment**: 6.913 million yuan
- **Technics**: UASB- – SBR
- **Treating Capability**: treating 450m^3 of dried distillery's wastewater/d;reaching the secondary emission of the National GB8978-96 "Comprehensive Sewage Discharge Standard" .
- **Environmental Benefit**: 0.35 million yuan/a
- **Economic Benefit**: 0.32 million yuan /a

Industrial Biogas Project—Problems

- Industrial bio-gas projects are mainly dis-tributed in agricultural produc ts industry in China.





Source：PAQUES，BIOTHANE

Industrial Biogas Project—Problems

Lack of national technical standard
Technical equipment can't reach industrialization demand
unhealthy service system
Weak rivalrousness of products

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Barrier to commercialization of biogas technology

Barrier to commercialization of biogas technology

Goal

The goal is environmental protection, not exploitation and utilization

Policy

community

Barrier to commercialization of biogas technology

Policy

As an enterprise, it faces not only the pressure of environmental protection, but also the utilization of downstream products.

Barrier to commercialization of biogas technology

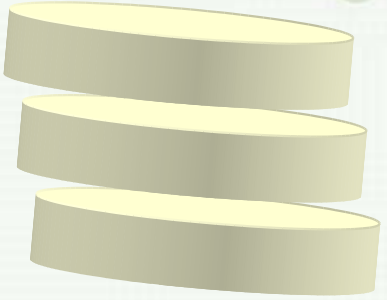
Technical criterion

The biogas technology is relatively mature, but there is no uniform technical criterion

Perceive of the community

Barrier to commercialization of biogas technology

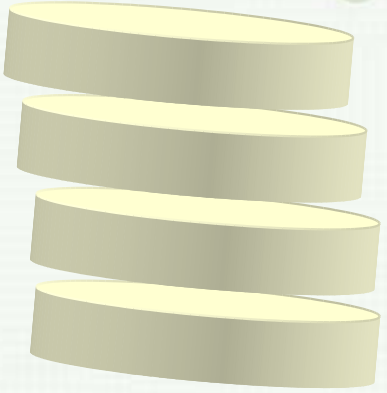
Perceive of the community



insufficient attention leads to difficulty of financing

Barrier to commercialization of biogas technology

Those barriers should be removed in order to promote the commercialization of biogas technology.



Our suggestions (1)

- Environmental → Energy
  - Policy support
    - compelling: compulsive entering of biogas electricity into grid （case in Germany）
    - encouraging: tax reduction for eligible enterprises

Our suggestions (2)

- Unify technical criterion
  - Unify technical index, expand the scale of equipment supply enterprises
  - Practitioner: professional admittance and certificate holding system, set up professional biogas construction team
- Intensive economy
  - Incorporate natural for intensive operation of biogas engineering in the unit of village

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  (Wang Bingjie)
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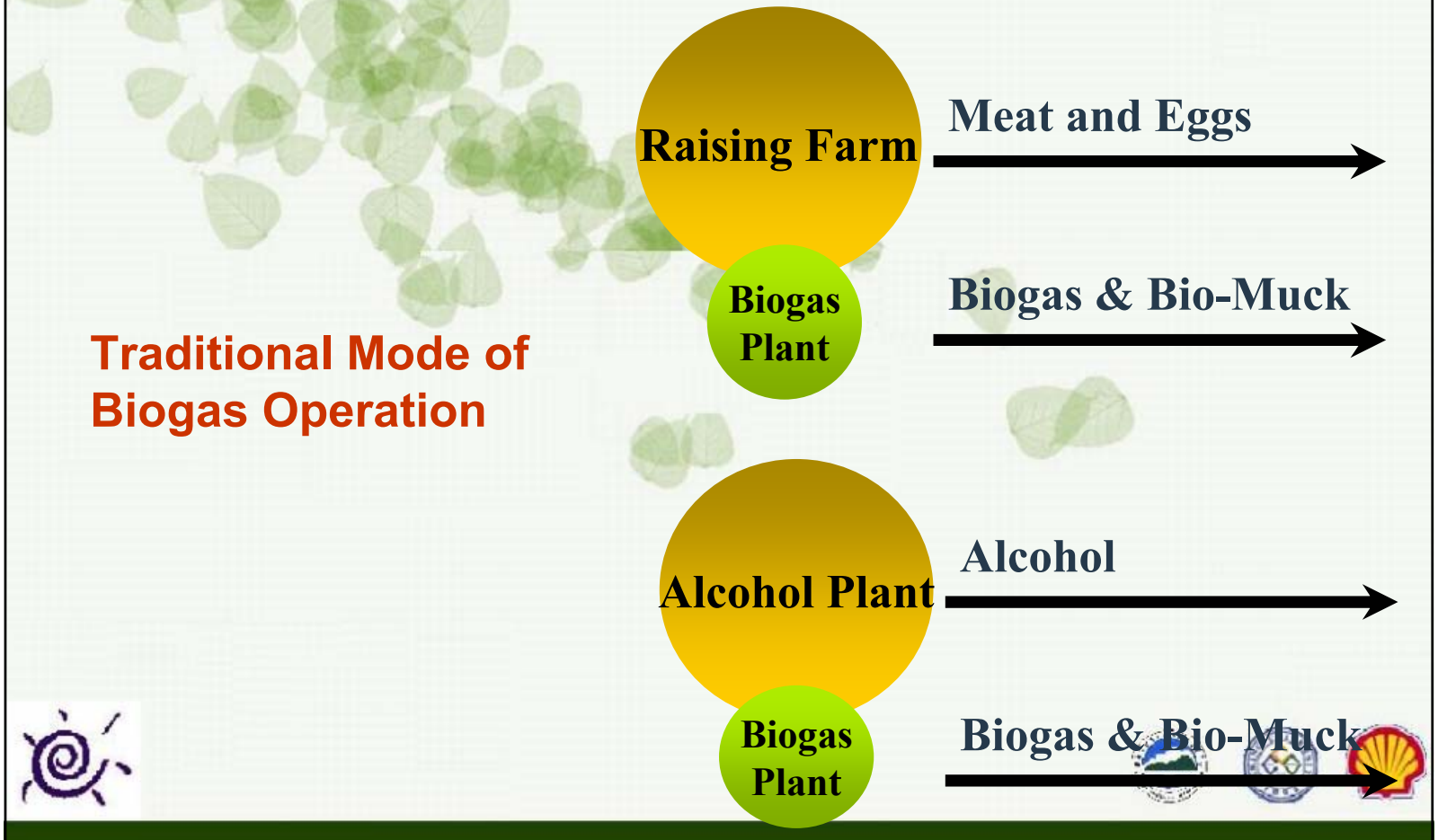
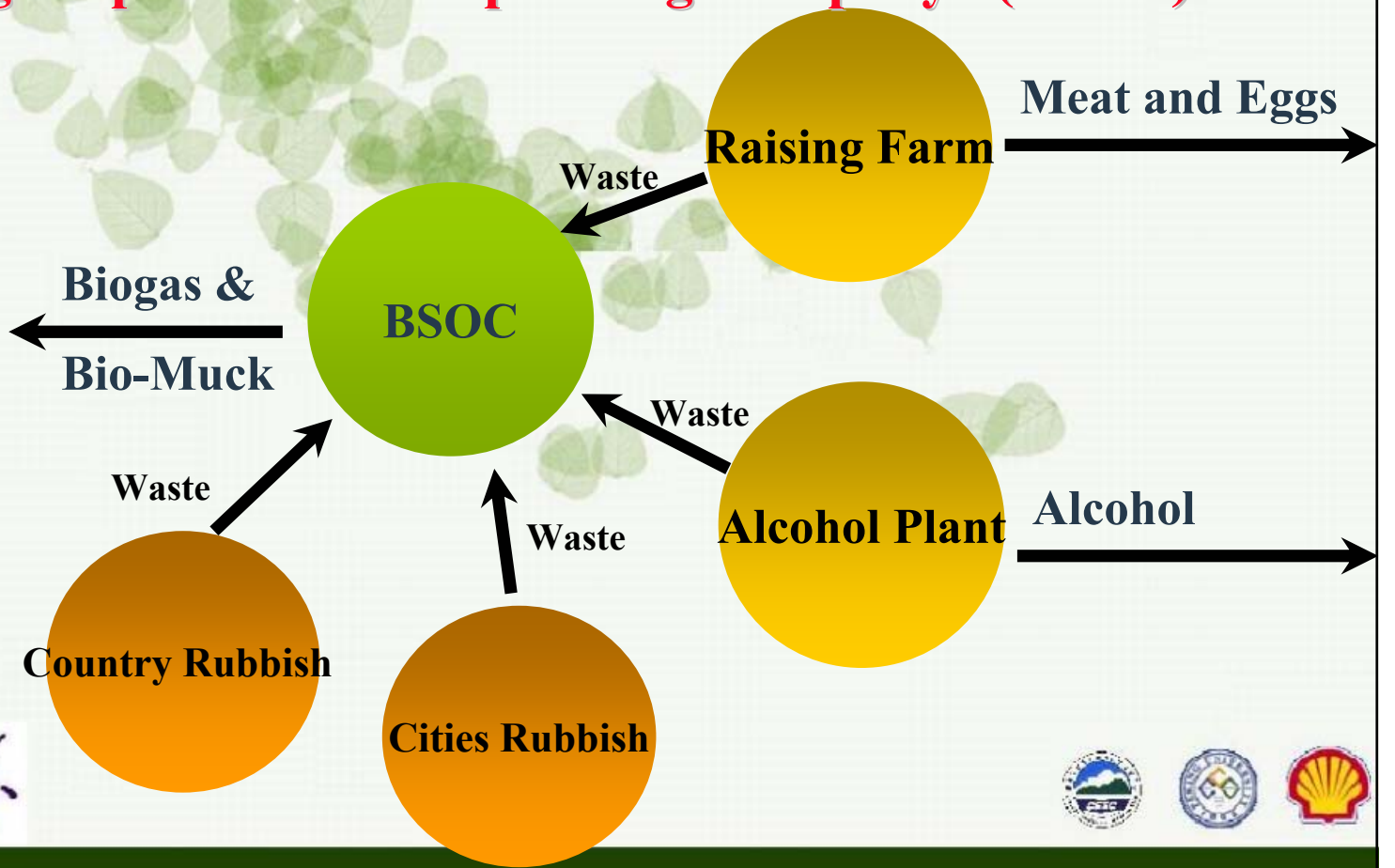
The Investigation About Marketing Mode of Biogas Operating



Our suggestion------New Mode for Biogas

Biogas Specialization Operating Company (BSOC)



Competition Advantages of BSOC

- Professional operation creates Profit
- Scale economics cuts down the operating cost
- Centralized operating decreases risk

Core competencies of BSOC

- Professional
- Standard
- Mass
- Insdutrial

Core competencies of BSOC

Professional tandard Mass ndustrial

- Focus on the development of Biogas project and its industrial chain.
- Improve the application of high science and technology

Core competencies of BSOC

Professio | Standard | Mass | dustrial

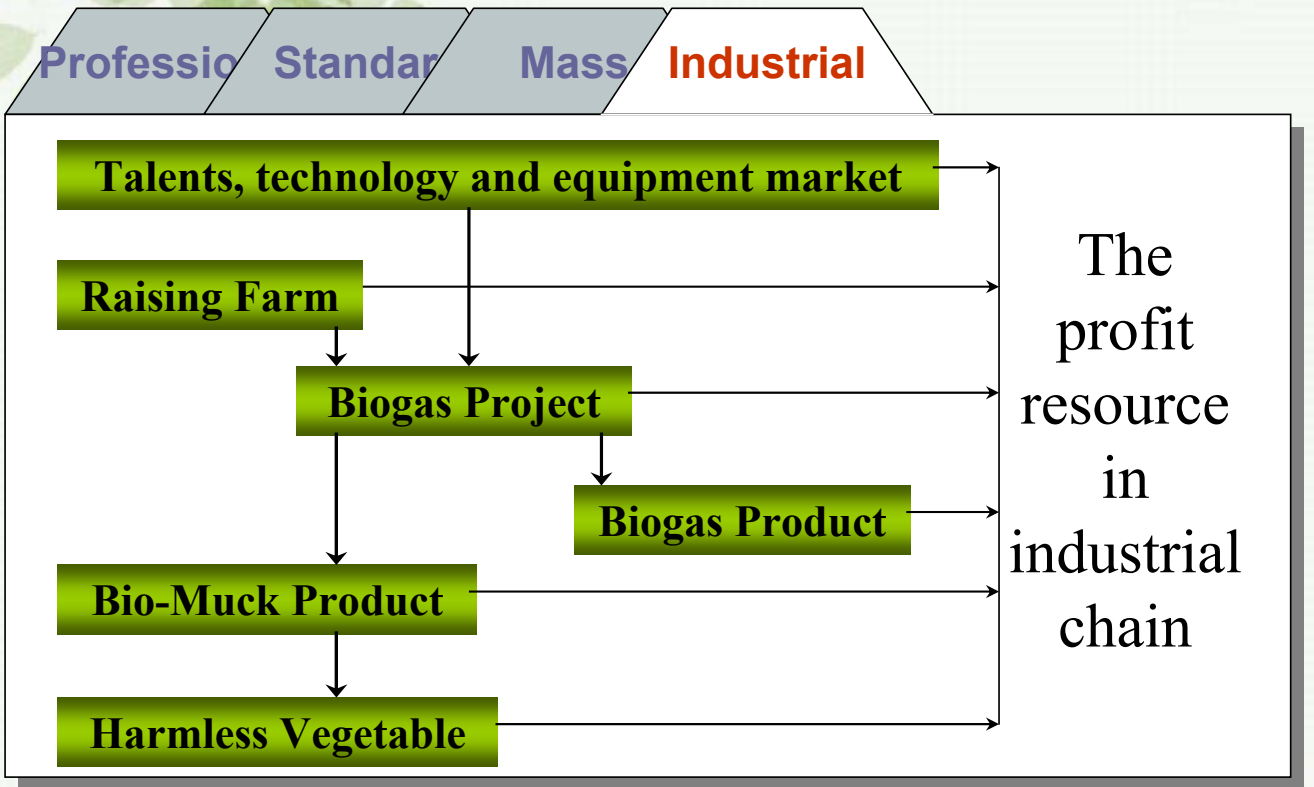
- Standard in technology and equipment
- Brand,Corporation criterion.

Core competencies of BSOC

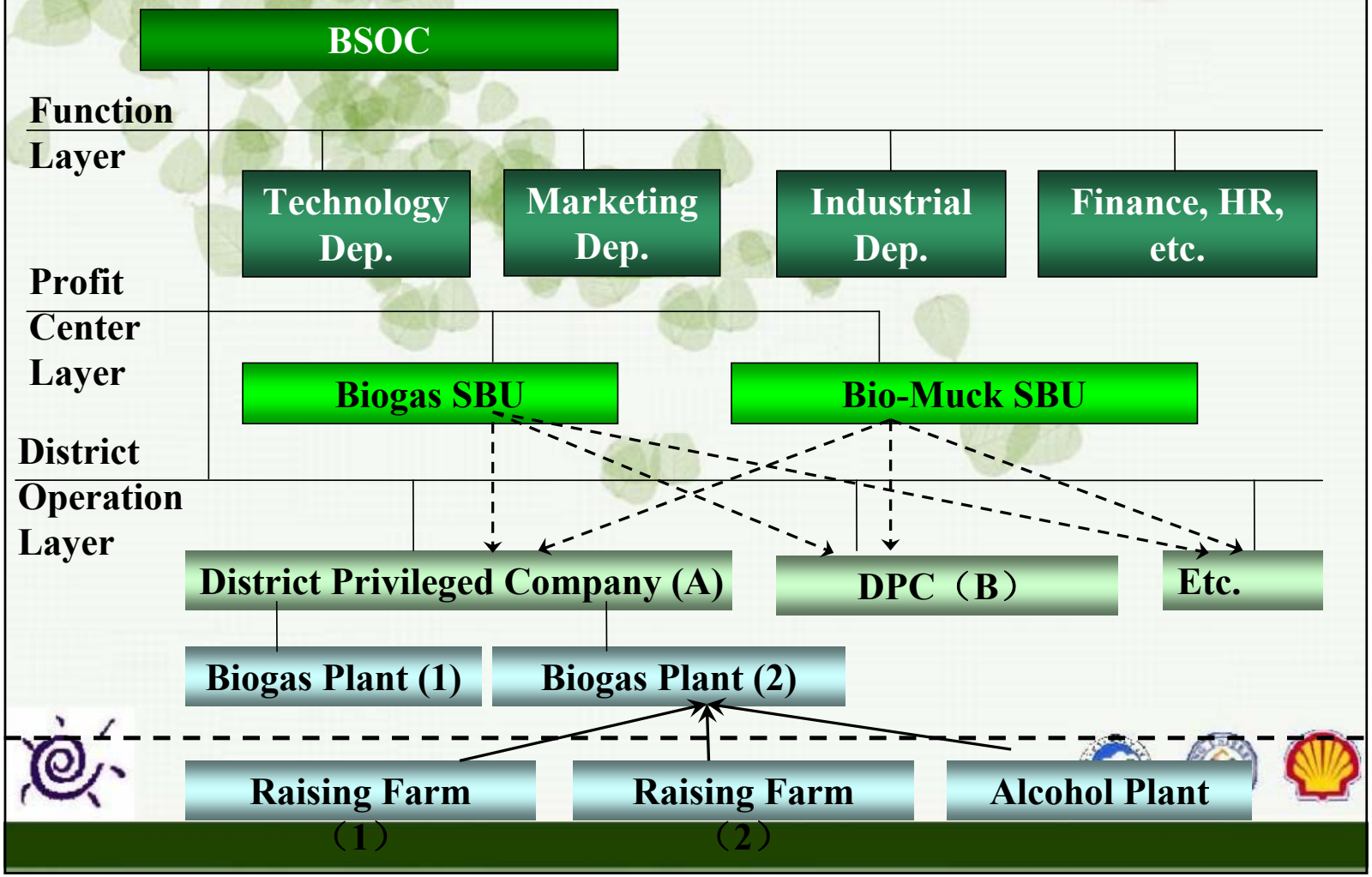
Professio | Standar | **Mass** | dustrial

- Mass collecting waste and dejecta
- Mass fermenting and producing
- Mass sales and Marketing

Core competencies of BSOC



Organization Structure of BSOC



Establishing, Financing of BSOC

Establishing:

Manager team

+ Private Capital (or venture Capital)

+ Government E&E organization

Start-up:

Government E&E Fund

Government E&E development program

Expanding:

Bank loan with low interest

Privileged Operation——Privilege Fee

Government Relation of BSOC

Why should government support BSOC?

- Tax
- Employment
- Environment Contribute
- Set an example for Solving E&E Problem

The way to expand---

District privileged operation units

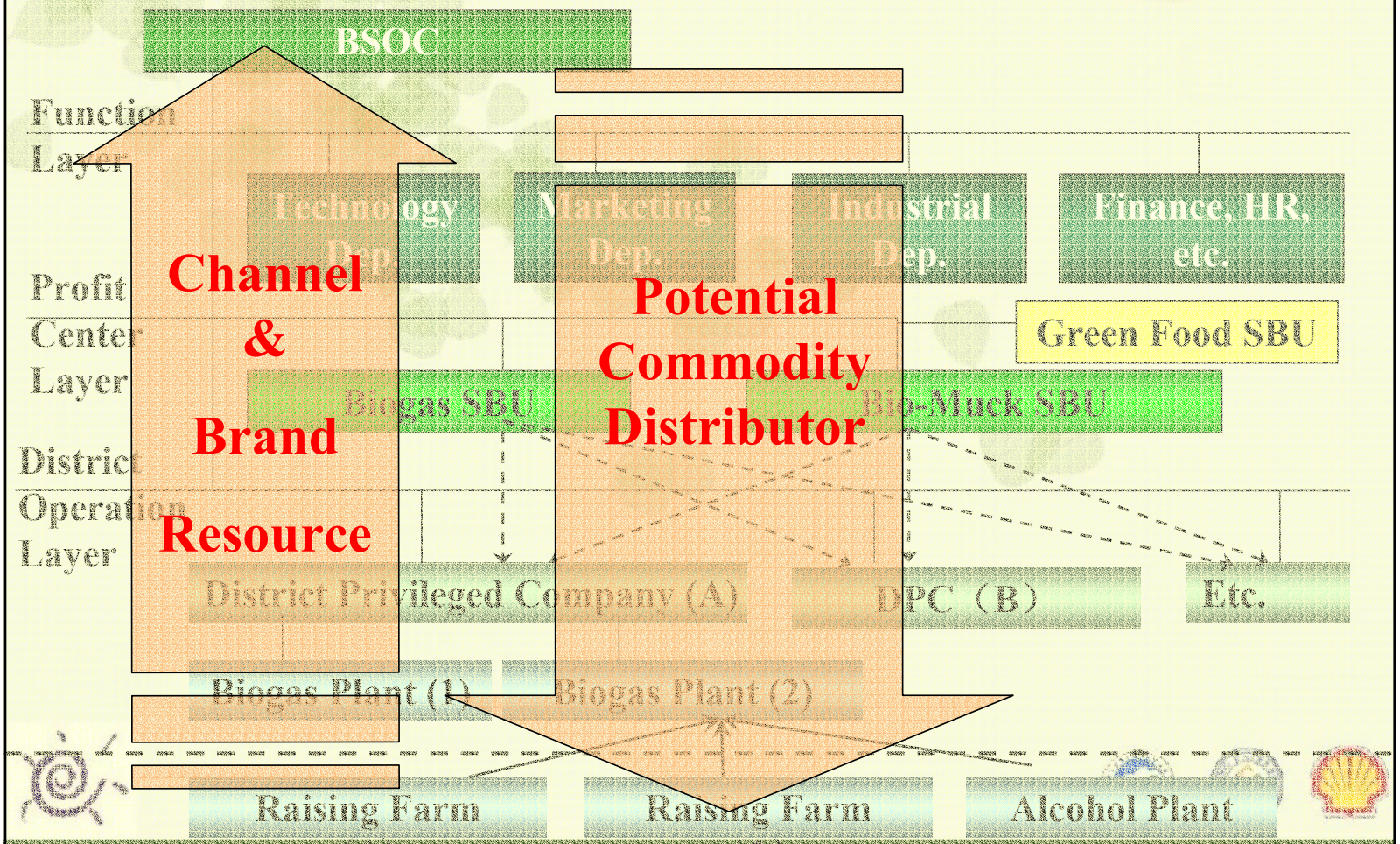
The "3S" standard

Simplification

Standardization

Specialization

The Future of BSOC



The Vision of BSOC

High Tech Company ——

To be a high technology company in the eyes of public

Public Listing Company ——

Stockholder socialization, break away the government feeding, and develop continually by self

Responsible Company ——

Be responsible for the E&E causes

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Case Study－－Danish Biogas Project

- **Danish central biogas plant**
  - There are about 20 such plants in the Denmark, collecting and disposing the livestock's dejecta and the waste from slaughterhouses as well.
  - Invested by private companies, financed by the loan with low interest.
  - Capacity: 50—400t/d

Danish Biogas Project

Danish Biogas Project

Project Benefit

- **Biogases** for generating electricity or heat-supplying for the residents.
- **Sediments** are sending back to the farm using as the organic fertilizers.
- **The covering radius** of one biogas plant is about **5 km.**
- **The income** comes from electricity-selling , heat-supplying and waste-disposing, however, it is free on the service for the peasants.
- **One 100 t/d plant** produces 4575m^3/d biogas,only needing 2 persons; the net profits can amount to **200,000 KRONE**

Related Organization

- Danish Biogas Plant Association

✓ to take charge of the economic interests of the biogas plants in their relation with other partners and with the authorities.

✓ to ensure the transfer of the achieved experience and know how between the biogas plants

✓ to ensure a fair access and distribution of the digestible biomass resources for all the biogas plants

✓ to raise awareness about the environmental benefits and the social role of the biogas systems

- The European Biogas Network

✓ Study tours

✓ Biogas training actions

✓ European biogas events

✓ Meetings and networking

- The Bioenergy Department , University of Southern Denmark

Sound Environment

Thank you !