Dezentral Biogas Plants in China

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About Biogas

What is Biogas?

mixture of gases:

- methane (60% - 70%)
- carbon dioxide (30% - 40%)
- a small amount of N_2, CO, H_2, O_2 *etc.*

About Biogas

Renewable Energy: can be used as fuel.

Energy content:

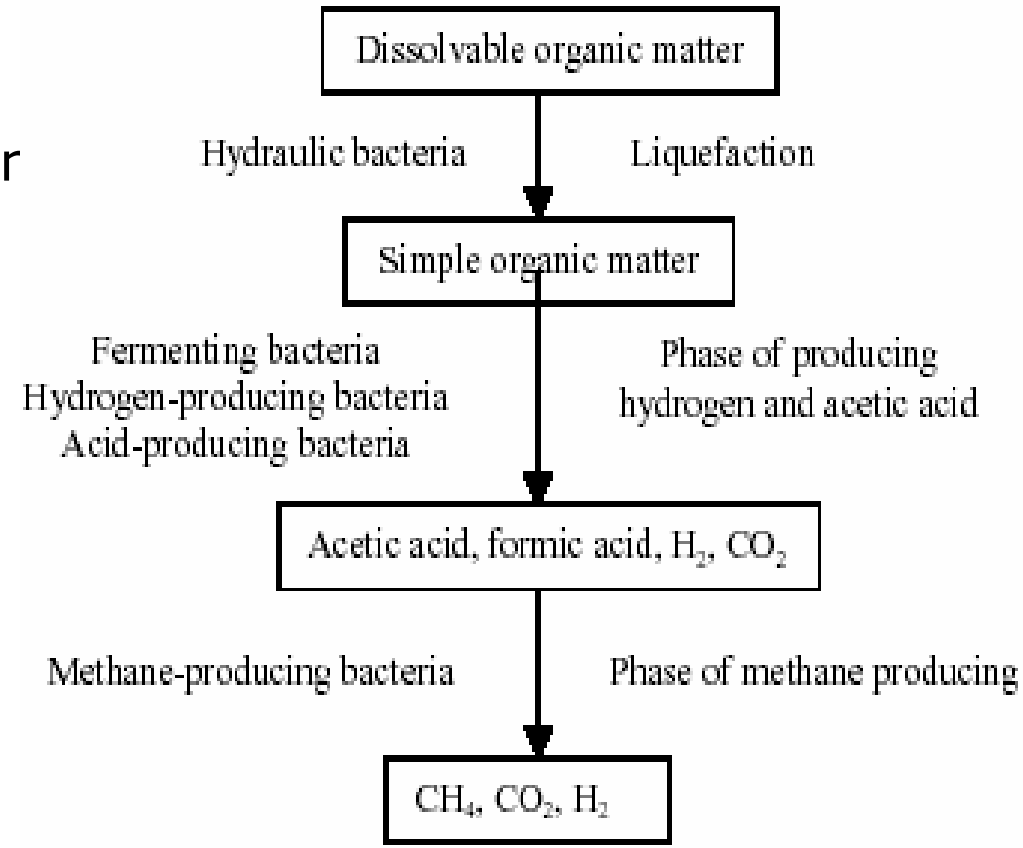
1m³ of Biogas =0.66l diesel fuel
=0.75l petrol (or gas)
=0.85 kg coal

Production of Biogas

The producing process of Biogas : Anaeobic Digestior (without O_2)

Three Stages:

- Hydrolysis
- Acidification
- Methane producing



About China

Area: 9.6 million km²

Population: 1322 million
ca. 56% in rural

Mid. Temperature:
winter:

North -10 ~ -20 ° C,

South 4 ~ 10 ° C.

Summer:

North 20 ° C ~ 26 ° C

South 28 ° C ~ 30 ° C

China: biggest biogas consumer in the world

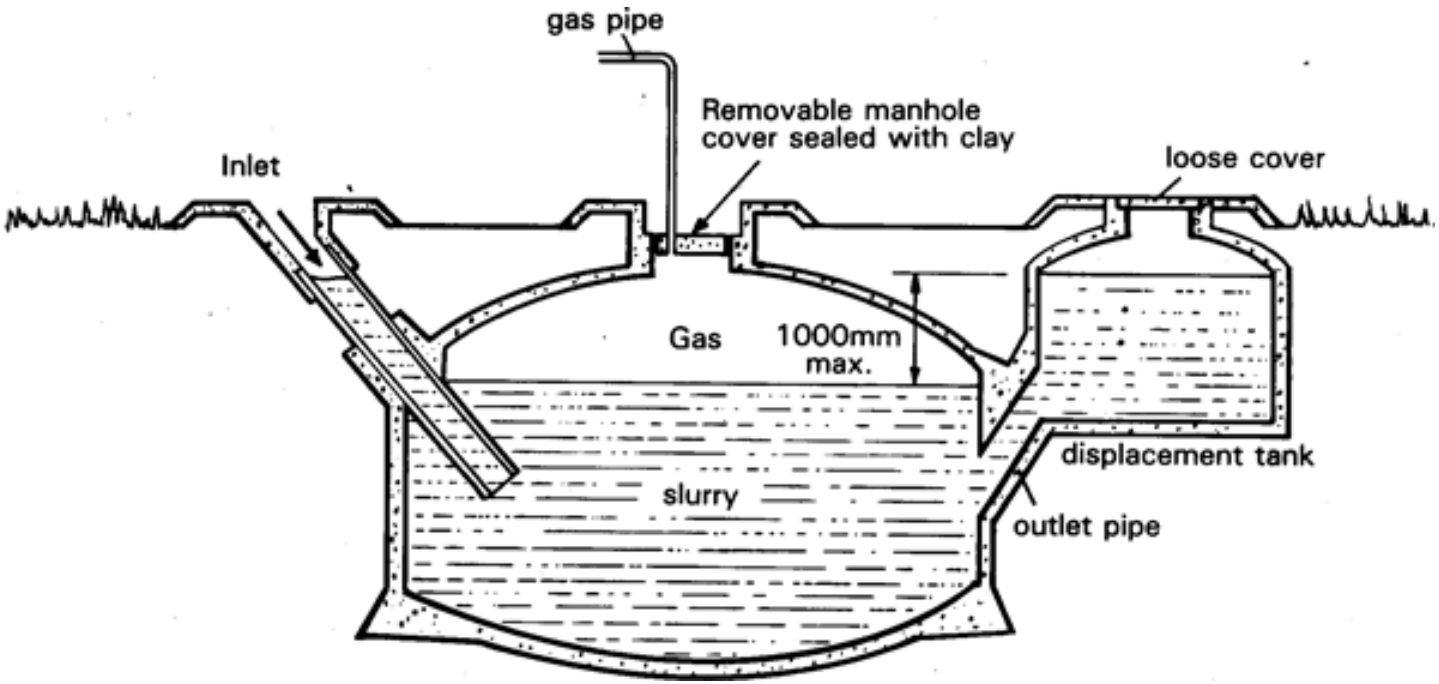
- First fermentation digester in china: 1921 , Guangdong
- Start: at the End of 1960´s
- by the end of 2007, ca 26 million household biogas consumers
- There are more than 4 million new consumers per year.
- More than 8 provinces have more than 1 million biogas consumers
- by the end of 2007: annual biogas production has reached to 10.4 billion m^3.

Biogas Development in China

Our biogas development plan:

- by 2010, annual usage of gas will reach 19 billion m^3
- by 2020, annual biogas usage will reach 40 billion m^3

Household biogas digester in China



- The volume of these household digesters is ca. 6-8 m³.
- Digester can be used for 15 years.
- Productivity: 0.15 - 0.25 m³ per m³ digester per day

Factor by Biogas production

- First of all, the biogas digester should be enclosed.
- Biogas digester must have adequate nutrients and bacteria.
- Fermentable material must contain adequate water, generally 80% water of the material.
- Temperature range between 20 ~ 40 ° C.
- pH value between 7 ~ 8.5.

Use for Household

Biogas:
- Cooking,
- lighting,
- heating,
- welding,
- also as fuel for the interna combustion engine

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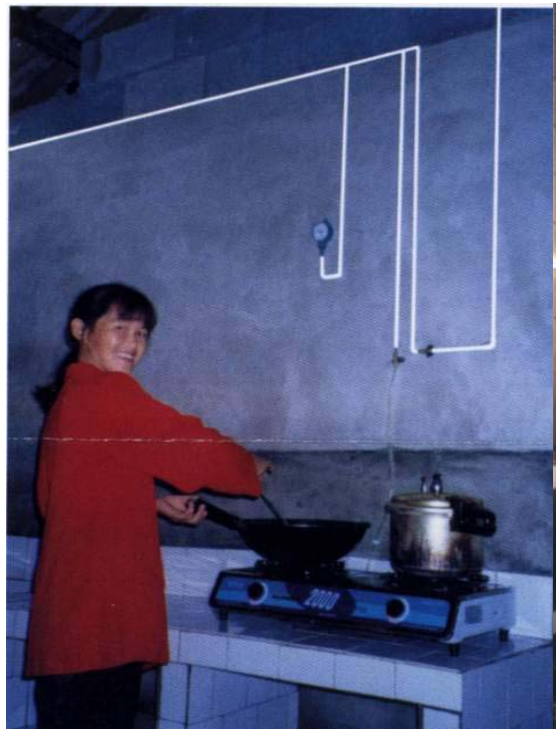
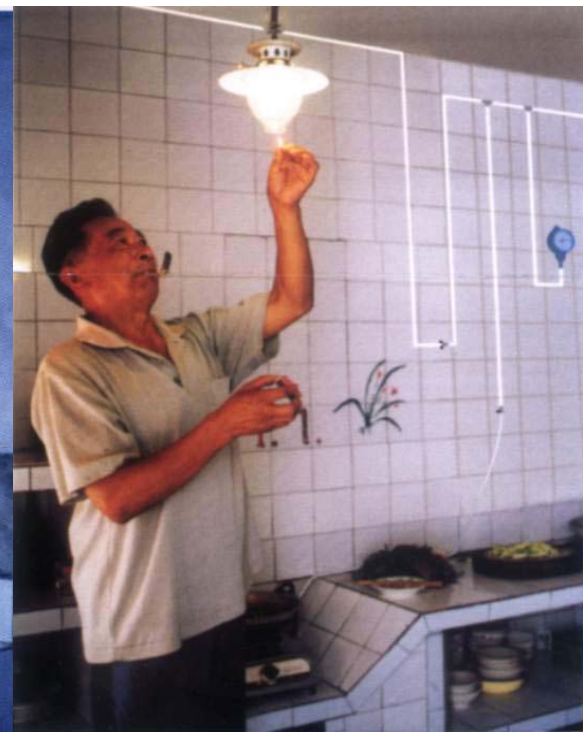
fermentation residue:
- can be used as fertilizer.





How to build a biogas digester

1. Chose the right place
2. Preparation the material (for example: brick, cement, sand, graved, metal…)
3. Positioning and digging according to the layer construction
4. construction of the digester, including intern, wall, roof and sealing layer

5. Construction of the gas transfer pipe to biogas user.

6. Quality control, including air- and water isolation.

Daily management of biogas digesters

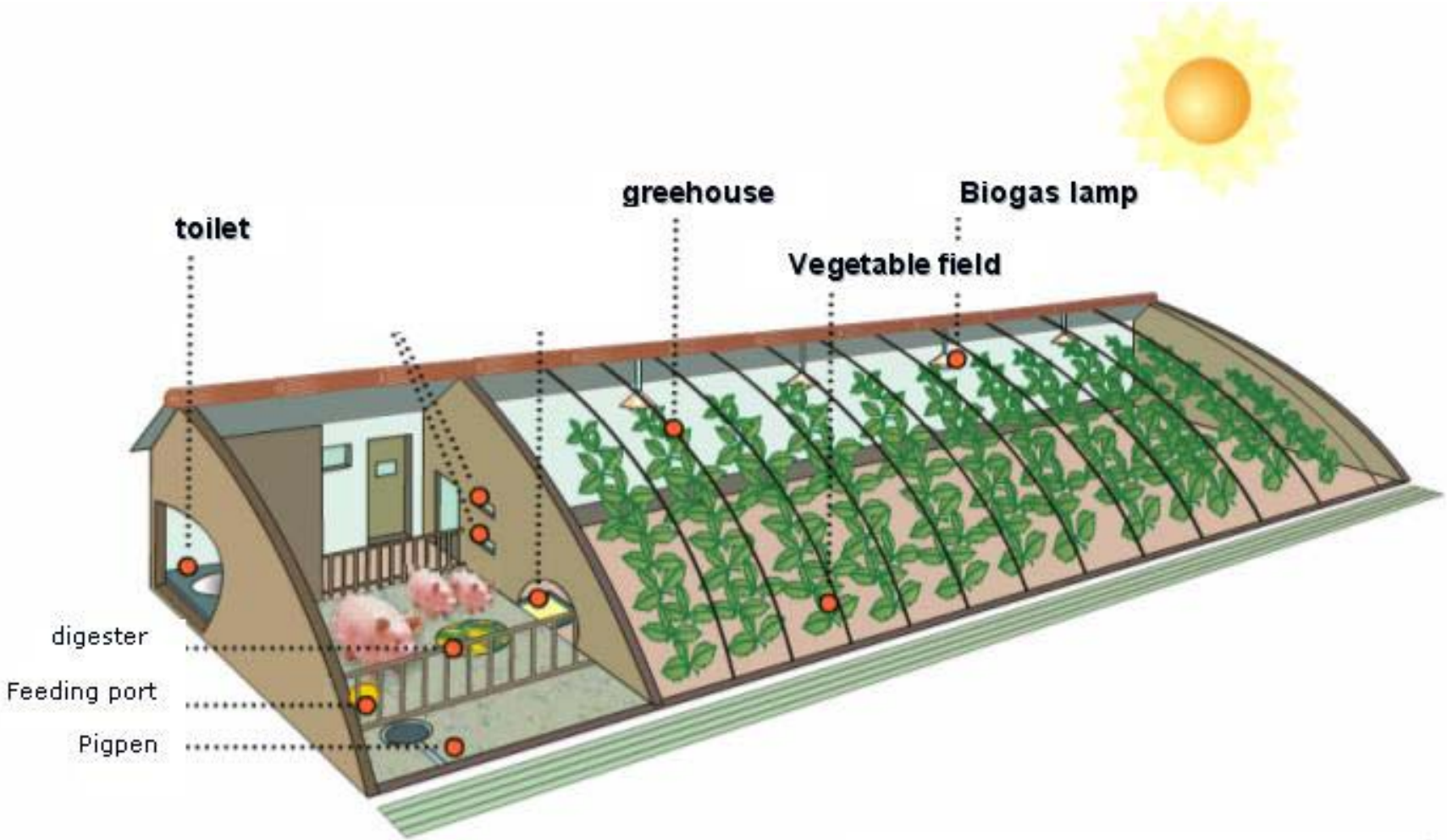
- frequently input and output: 20kg fresh materials input per day
- Before winter some precaution should be done to make sure the digester can work normally in winter.
- Safe use of biogas: keep flammable liquids away from gas appliances, prohibit fire test in transfer pipe, turn off the switch when not using the biogas……
- Regular check of pipes, joints, switches, cover of entrance and exit pipe
- Regular check of the water column pressure
- Gas-tight control every year
- Attention of staff security during the inspection and maintenance under the digester

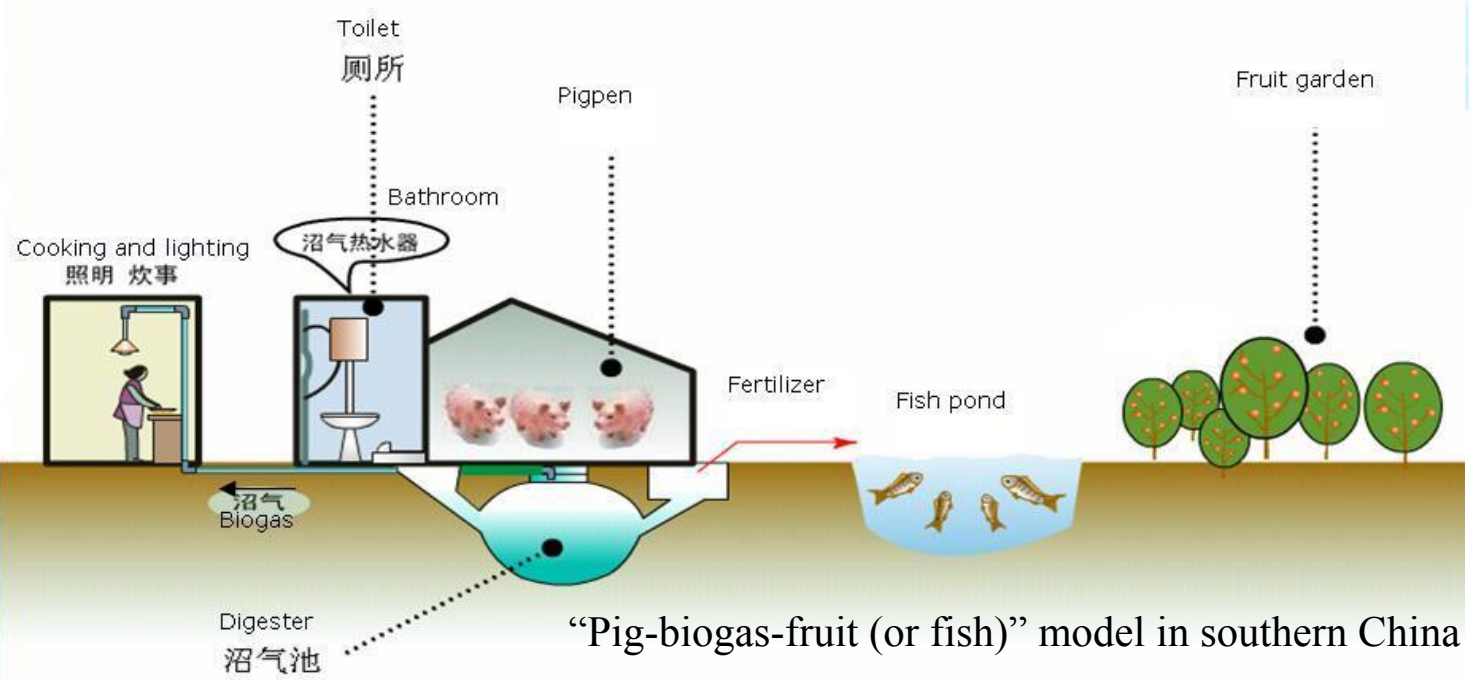
Treatment in winter

- Insulating by covering plastic layer.
- Insulating by material stack.
- Annular ditch: build a ditch around the digester, in which will be filled with straw.
- Pouring of hot water > 20° C by input and output process.
- New digester may not begin to operate in winter.
- Solar module: the general method for heat preservation in the biogas digesters.

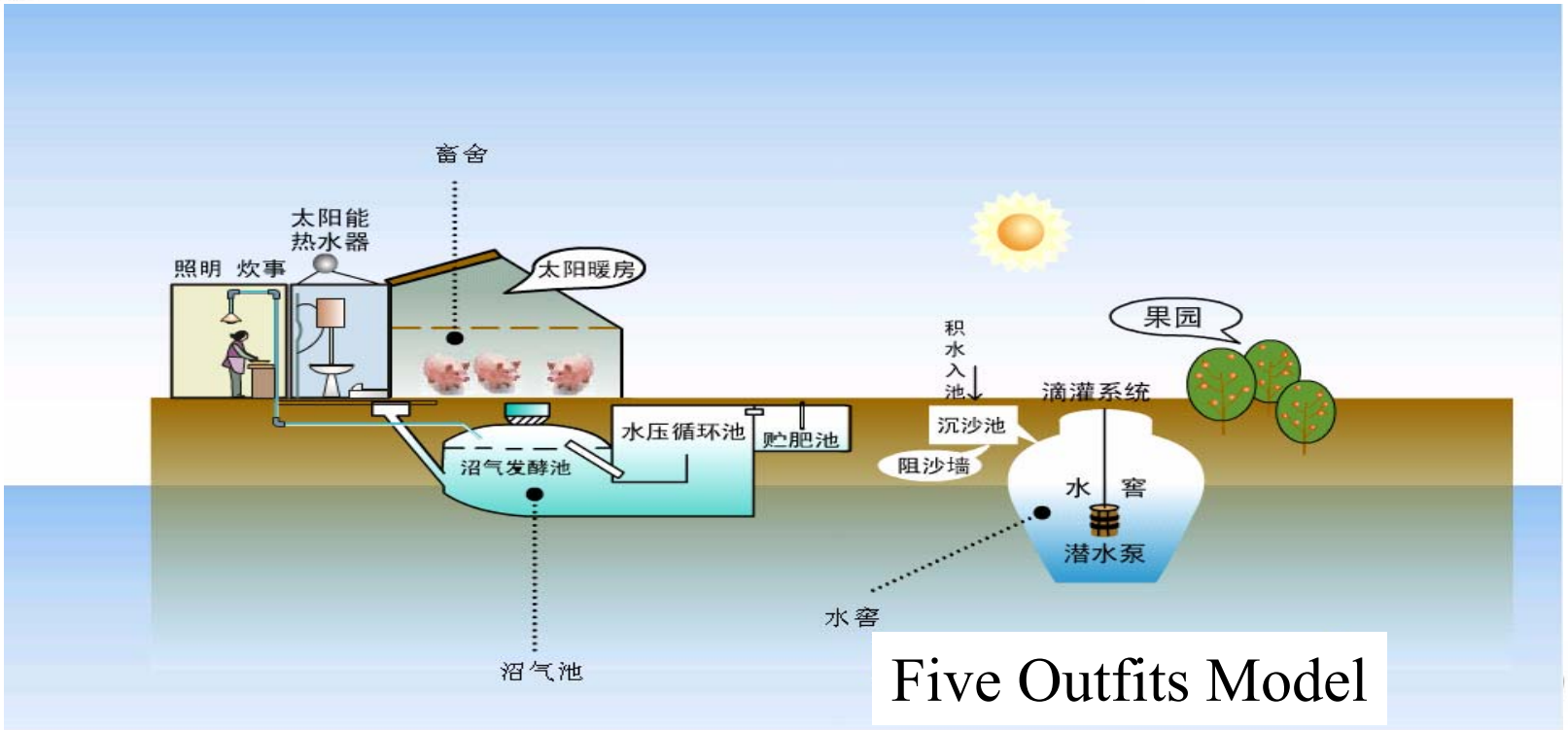
Ecological Homeland Systems

"Four-in-one" Biogas Model In Northern China (317,800 households)





"Pig-biogas-fruit (or fish)" model in southern China

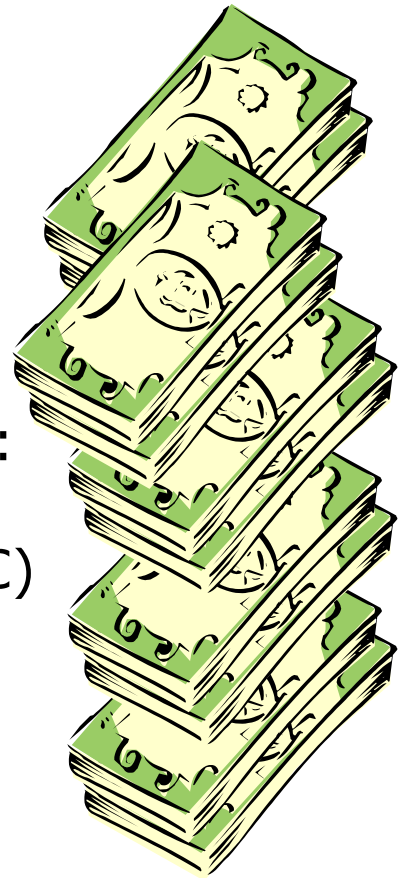


Five Outfits Model

Investment costs

- Normal household biogas digester 6m³:
  - 1400 RMB (140€)

- Four in one system:
  - Cost for 8 m³ biogas digester and 15m² pigpen: about 3000 RMB (300€)
  - Cost for 500 m² greenhouse is 8000 RMB (800€)
  - Total: 11000 RMB (1100€)



Social benefit

- Job creation for local people
- Health improvement—disease reduction due to utilization of clean energy and use of end products as land fertilizer
- Lifestyle improvement

Economy benefit --- income increase

- Energy saving
- Farm development
- Various use of end product

Model	Pure benefit yearly (unit: RMB)
Household biogas	**600**
Northern “four-in-one”	**3000**
Southern “pig-biogas-fruit”	**2000**

Environment and ecology benefit

- Protecting forest and fossil energy substitution
- The soil can be improved
- Avoiding the pollution from organic wastes
- CO_2 and CH_4 reduction

Actual Situation:

- 1991: Greenhouse gas reduction 2.4 million ton
- 2005: Greenhouse gas reduction 14.4 million ton
- 15 years: total 88 million ton greenhouse gas have been reduced

Future Situation:

- 2010: Biogas production 16 billion m³
  Greenhouse gas reduction 29.8 million ton
- 2020: Biogas production 40 billion m³
  Greenhouse gas reduction 72.8 million ton

Thank you very much !