

Biogas Use in China and its Sustainability – Service network

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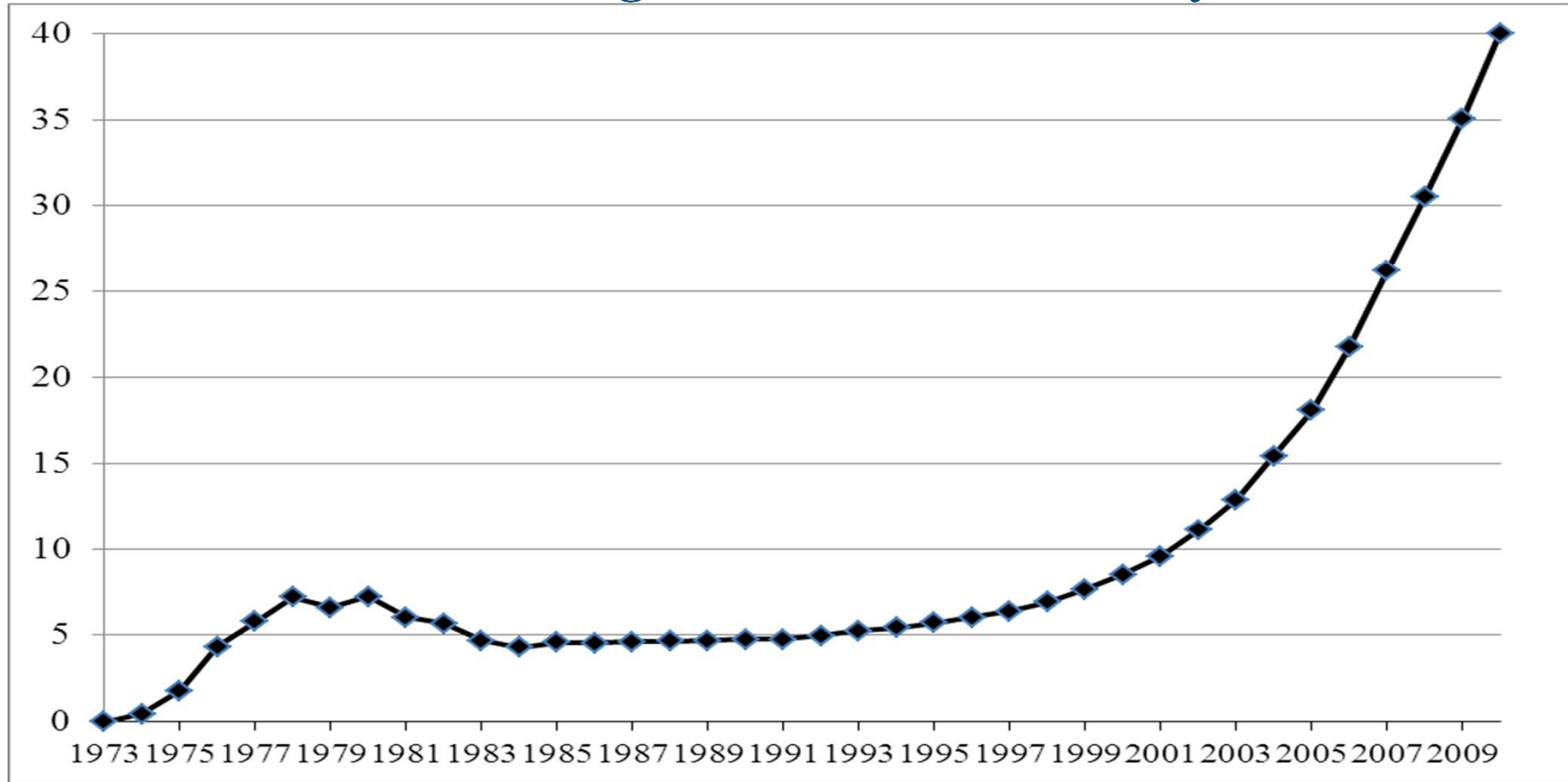
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Fast development of biogas use in rural China

Numbers of household digesters at the end of the year (1973-2010)



Data source: Ministry of Agriculture, data in 2010 is an estimated number.



Fast development of biogas use in rural China

- Fast growing after 2000, especially after 2005
- “2003-2010 *National Rural Biogas Construction Plan*” in 2003, a revised version published in 2007: “*National Rural Biogas Construction Plan (2006-2010)*”
- In 2008, financial crisis, stimulate economic growth
- Ministry of Agriculture, rural biogas construction has become one of the most important programmes concerning people’s well-being, and a highlight in the development of a new socialist countryside



Problem of sustainability (service network)

Sustainability problem, mainly comes from three aspects:

- Rural life style change, less materials for fermentation (animal manure, human excreta and other organic waste)
- Off-farming, less people in the village especially young
- Service network. In last 10 years, pay too much attention on building digester, not enough for service network



Problem of sustainability (service network)

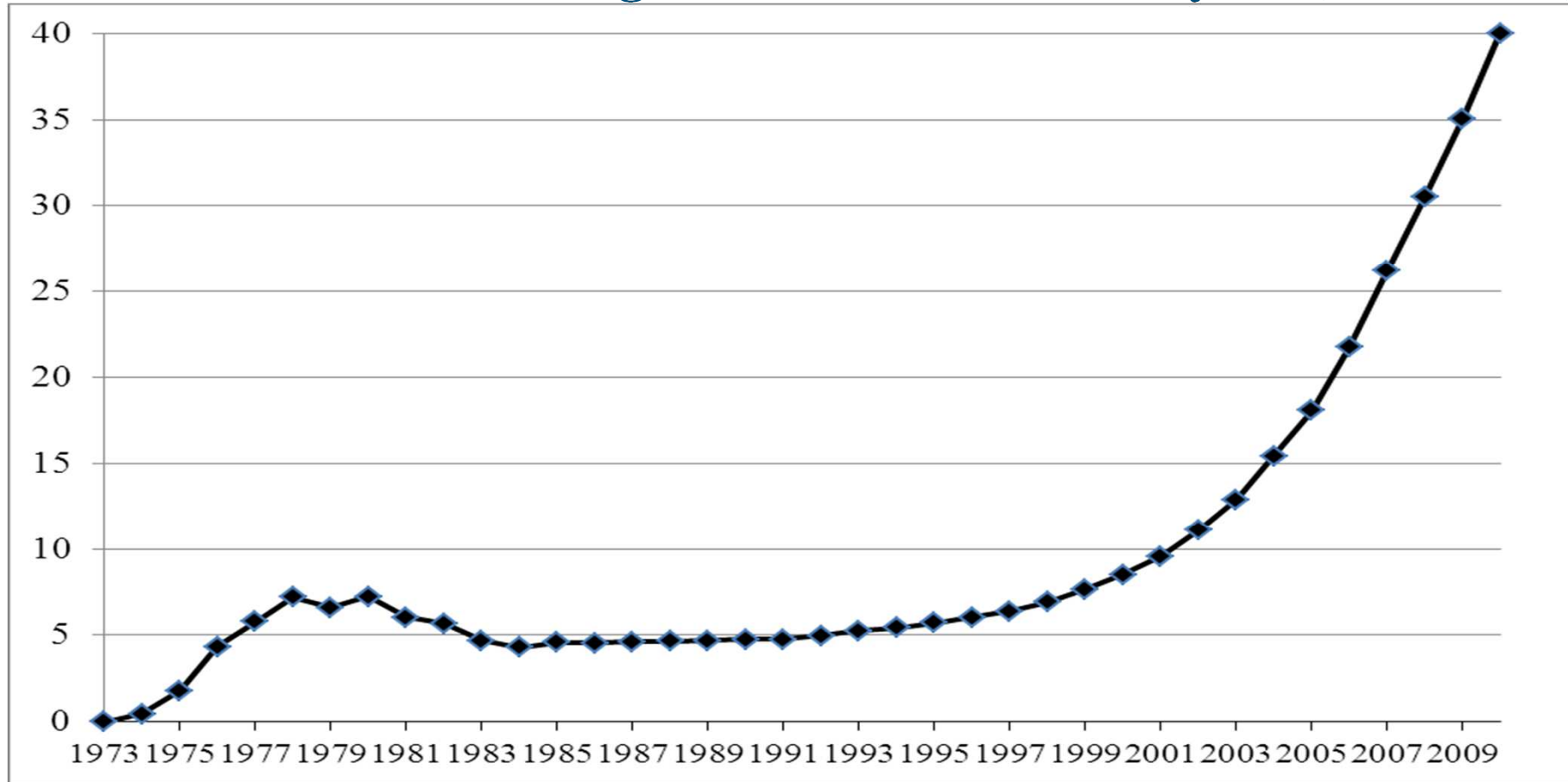
Government realized the problem, published *National Plan of Building Rural Biogas Service System* in 2007

- Early 1980s, decrease of biogas digester were mainly due to lack of service network
- Service network: 300-500 households 1 service station, equipments and tools need 31k Yuan, central government subsidy: 19k west, 15k middle, 8k east
- Some general rules



Fast development of biogas use in rural China

Numbers of household digesters at the end of the year (1973-2010)



Data source: Ministry of Agriculture, data in 2010 is an estimated number.



Problem of sustainability (service network)

Problem still remain: can the service station survive without subsidy from government every year?

No



Data

Household survey in 4 province: around 300 for each,
1200 in total





From west to east:

Gansu

Guangxi

Hubei

Shandong



Results

Service network: 3 modes

- Fully market-based private service: only pay after the service
- Farmers' organization based: members pay a small amount of fee every year and get service with a reduced price
- Insurance-based: pay a fixed amount as the insurance every year, get service for free

Multinomial Probit model: choose one from three

Results

Some calculation:

- Less than 1/3 (28.6%) of digesters had something wrong after building, every age of digesters is 4.6 years, so, the annual failure rate is 16.1%
- If one station provide service for 500 households, income from service is $0.161 * 500 * 20 = 1610$ Yuan
- The income only from service is far away to support a service station economically

The service network is not sustainable!

Results (mode 1 is the base outcome)

Variable	Mode 2	Mode 3
Age/10	-0.662	-0.900*
Age ² /100	0.0709	0.0842*
Years of education	0.0339	-0.0619**
Village leader / party member	-0.00398	-0.00574
Family size	-0.263***	-0.148**
Family member stay at home	0.162*	0.106
Log (consumption)	0.204**	0.0561
Risk aversion	-0.0777***	-0.0703***
Trust relatives	-0.116*	-0.141***

*** p<0.01, ** p<0.05, * p<0.1; 656 observations



Results (mode 1 is the base outcome)

Variable	Mode 2	Mode 3
Joined farms' organization	0.391	0.577**
Use biogas together with others	0.130	0.171**
Too much gas in summer	0.00257	0.366**
Not satisfied with current service	0.258***	0.180**
Whether to buy a fully service package	0.137	0.743***
Average biogas failure yearly since built	0.194	0.0980
Hubei Province	0.137	0.00219
Shandong Province	1.579***	-0.307
Gaunsu Province	0.639**	-0.291

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Conclusions

- Current income from service is not enough to support a service station, heavy subsidy (other financial support) or insurance-based service may be needed.
- In literature, (private) insurance is a local public good. Cooperation or other related factors may have impact on farmers' decision-making (what type of service?)

Thanks!



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