



Stoves Development in China

Presentation at 2005 ETHOS

Chen Xiaofu Liu Guangqing

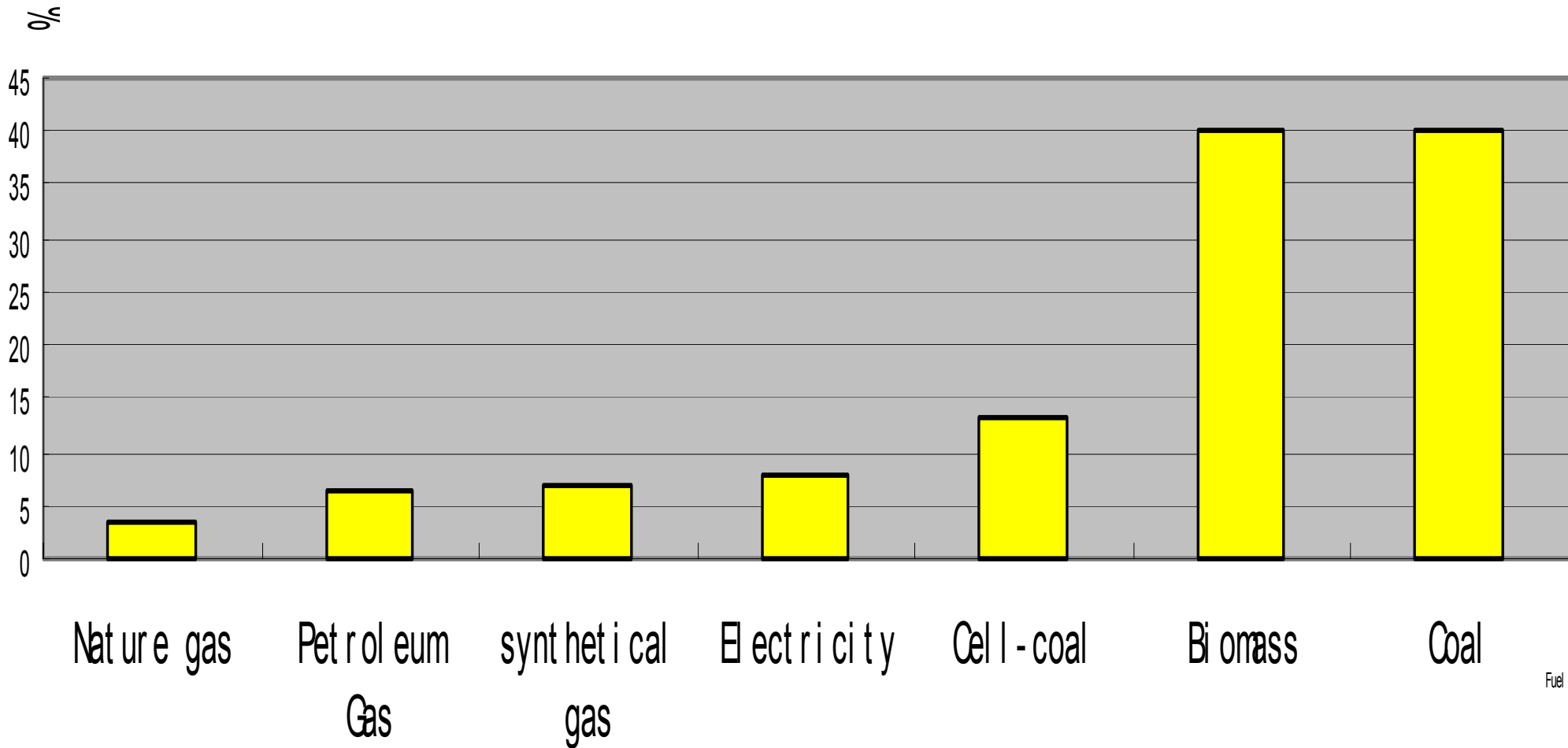
China Association of Rural Energy Industry
(CAREI)



Introduction

- 900 million rural population, 22 thousand households in China
- Stoves are traditional devices for farmers, mainly using coal and biomass
- Biomass (straw, wood and crop residuals etc.) and coal is the major domestic energy
- Policies to widely promote and disseminate improved rural energy technologies have been introduced in China since the early 1980s.
- Over 200 million reformed stoves were applied up to now. All the existed stoves have great diversity.
- There are more than thousands of stove enterprises up to now.

Structure of Rural Energy in China



Structure of Rural Energy in China

Major Types of Stoves in China



1. Wood-saving Stove

- Handwork building
the earliest one
- Commercial Stove
can't disseminated well
- Semi-assembled Commercial Stove
better for dissemination.

2. Kang-linked Stove

Stove is linked with Bed for heating and cooking, mainly used in rural area of north China.

3. Stove for Briquettes and Granule Fuels

The fuels are made by high pressure into particle and shaped fuels for direct burning

4. Domestic Heating Stove

Major for heating, primarily using High Density Biomass particle and coal as fuel.

5.Domestic Semi-gasification Stove

Introduced in the middle of the 1990s.

Including desiccation, carbonization, gasification and combustion process.

It was efficient and low pollution.

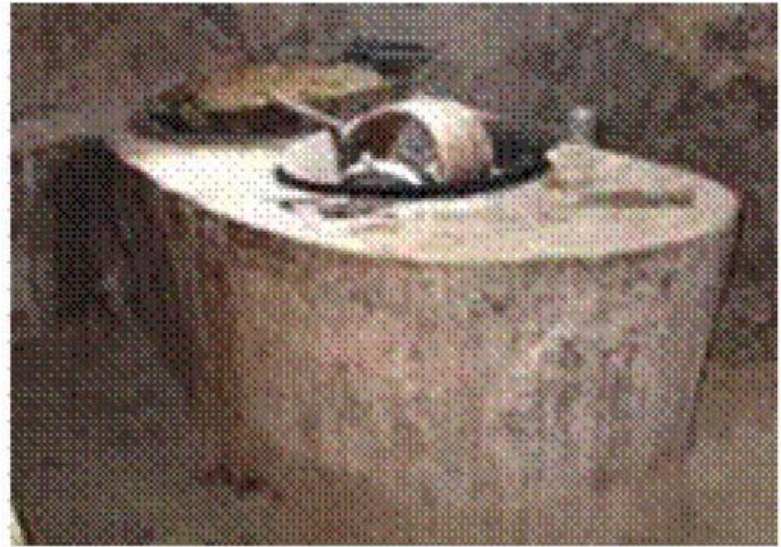
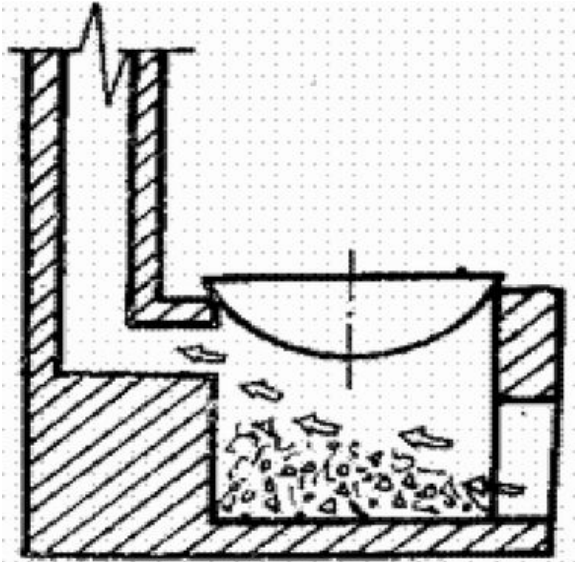


Development History of Stove in China

a) **Primitive Phase** (Early 80's)

The hand made traditional stove was used in great majority of household in China's rural area before 1980s. Efficiency of only around 12%, waste energy and great air pollution.

The problems are one high (combustion chamber height, some even reaches 30cm), double big (stove door and combustion chamber), three missing (griddle, air duct and chimney).



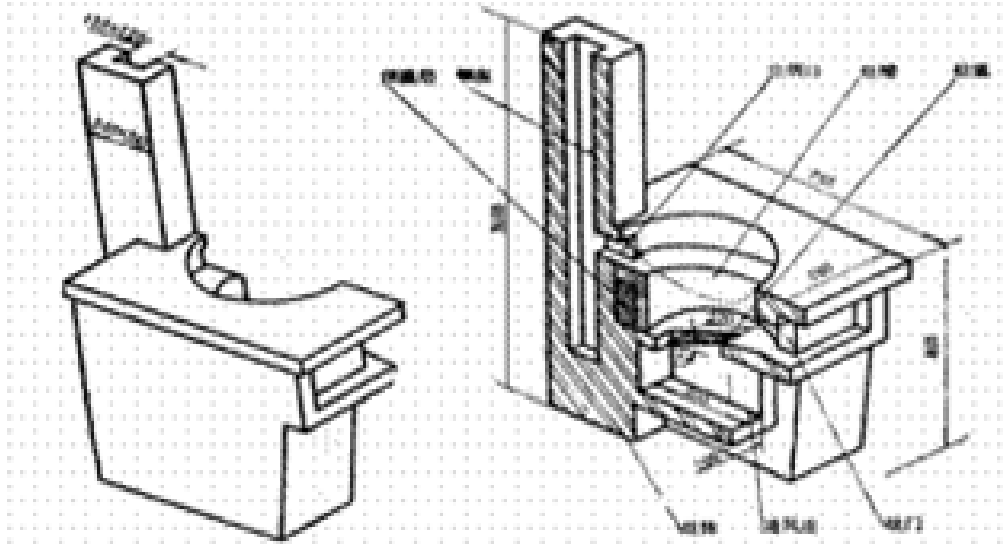
Traditional Stove



b) Improvement and Dissemination Phase

(Early 80's □ Middle 90's)

1. Devoting and proficient technicians were organized to go to rural poor areas to promote stoves. Adopting to the custom of the local people, they transformed the stove and made it adaptive to the local people.
2. Training courses were held layer by layer from the central to the local government, combining situ-demonstration and theory. Plenty of technicians were trained to guarantee the improvement of the stove.
3. In order to enlarge the dissemination, deeper dissemination including movie, slideshow and pictures of stoves were launched to make the fire-wood saving stove impressed.
4. Carrying out the national project of “Integrated Construction of Rural Energy in One Hundred Counties”, which made “stoves improving” as the main contents.



Handwork Brick Stove

The technicians reformed the structure of the stove

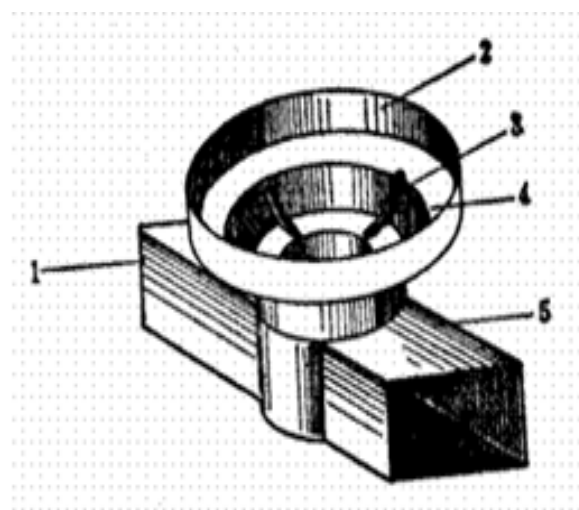
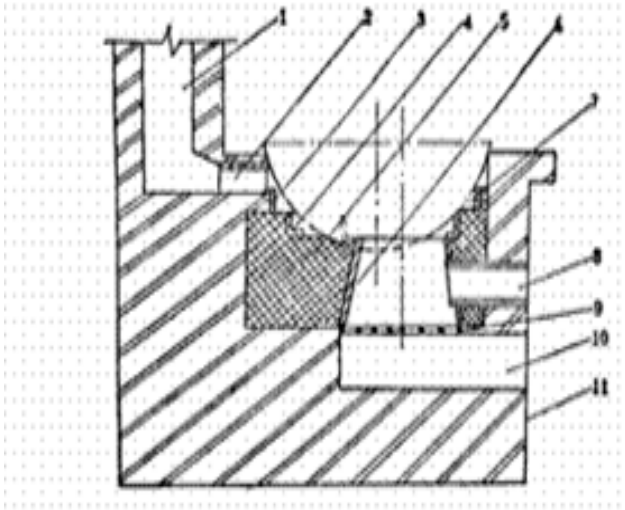
Commercial Stove

The different custom and fuel composition of different area and the weight of the stove, transportation was limited by the range of the service



Semi-commercial Products

The significant change is putting the cast iron secondary air circle into the core of the stove, reaching a better effect (for example, 1.9kg firewood after 28 minutes can heat 35kg water, the thermal efficiency is 39% during the temperature rising phase). This product has numbers of types and high popularization In rural area,

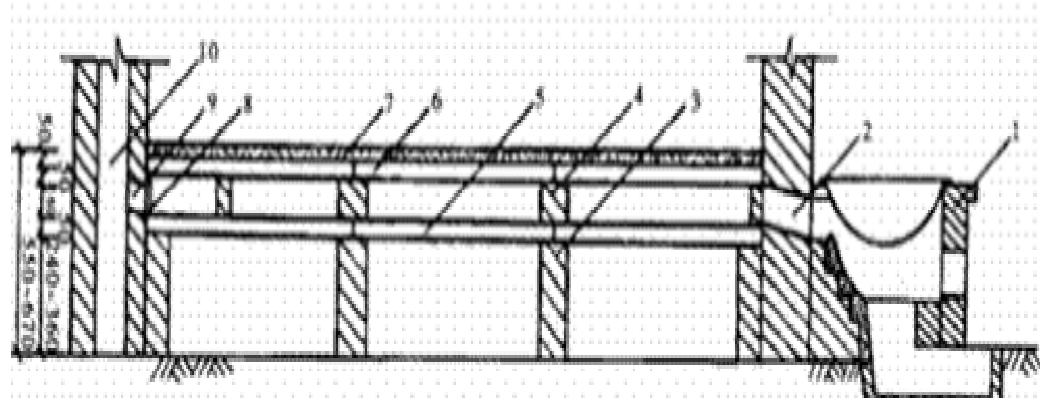


The Structure of Semi-commercial Stove

Farmer was installing the semi-commercial stove into the handwork stove.

Kang-linked Stove

This kind of stove For heating bed and cooking. Comparing to the traditional stove, the thermal efficiency of turned to 25%~35% from 14%~18% with more than 70% of increment. It is not only efficient but also good looking. It had the advantages of low cost, effective, simple, easy to learn and make.



structure of the Kang-linked Stove



appearance of the Kang-linked stove

Domestic Heating Stove

During this phase, there were many household heating stoves appeared. It's main fuels is coal and granules.



c) Innovative Phase (Middle 90's-Present)

- *Development of Coal-Using With Low Emission Stove*

The thermal efficiency can reach 65%~80%, the smoke opacity is less than 1st lever Ringelman, smoke density is less than 50mg/Nm³,

More than 10 companies producing this kind of stove with the output around 30,000 annually and more than 100,000 accumulated outputs.



Domestic Biomass Semi-Gasification Stove



Factories distribution in China



Users distribution in China

- ***Semi-gasification Stoves for Pressure Forming Particle or Stick Shape Fuels***



. Biomass Granules



Granules Stoves



● **Semi-gasification Stoves for No-process and Original Biomass**



Semi-gasification stoves



d) More attention to Integrated Construction and IAQ

Indoor air quality monitoring activities were conducted in our project. The result proclaims that traditional and open coal stoves lead to serious indoor air pollution.



Pollution situation in farmer's kitchen



Prof. Kirk. Smith was giving instruction



Development Barriers of Stove in China

- Biomass gasification stoves are not very applied The commercialization is only on the beginning phase.
- The operational convenience is need to be improved.
- Small companies remain the major domestic stove providers, which have barriers to provide guarantee, gain more market share and survive for ever.
- Research power, innovation and encouragement system are insufficient.
- Technologies and products patent is not well protected.
- Lack of the awareness of indoor air pollution.
- No stable and efficient maintenance system and management system.
- scarcity of communication and exchange with the other countries .

Strategy to the Development of Stove in China



- Making positive policy to support stoves promotion linked with integrated construction, which lead to better comprehensive effect .
- Creating development space for good enterprises and building reputation and market share for good products.
- Improving the patent protection system, market order and maintenance system of stoves products .
- striving for more finance support visa any possible way, establishing the active encouragement and innovation system.
- Improving the farmer's awareness of the harm of indoor air pollution.
- Strengthening the cooperation and communication with various countries in the world, buliding a global partnership platform, importing advanced technoligies and exporting outstanding stoves in China.

A scenic landscape featuring a lush green valley in the foreground, a small village with traditional houses in the middle ground, and a large, forested mountain in the background. The sky is bright and slightly hazy.

Thank you