



METHANOL
INSTITUTE

METHANOL COOK STOVES



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INTRODUCTION

A methanol cook stove is a liquid fueled cook stove designed to use methanol only. Without any major changes in how people use the cook stove, methanol can directly replace existing gas, electric, diesel, and liquefied petroleum gas (LPG) stoves. The major difference between a methanol cook stove and an ordinary LPG stove is the stove's core. The stove's core in a methanol cook stove has a gasification chamber which pipes fuel directly into the nozzle before the fuel gets heated to a temperature of 65°C, and before methanol starts to change from liquid to vapor state, it will flow back to the combustion chamber for ignition.

Although methanol has a comparatively lower heating value than LPG, diesel, or natural gas, the economics of using methanol as a fuel can be more or equally competitive as the other fuels. As a liquid fuel, methanol is relatively safe and convenient to use in cooking. Methanol does not leave any residue or sludge, does not carbonize the wok bottom, and it is clean and hygienic. In China, methanol is replacing LPG and kerosene in the kitchens of hotels, restaurants, schools, company canteens, and households. In India, the state of Assam has distributed cook stoves to residents in a pilot project that aims to increase uptake of methanol as a clean fuel for cooking. Methanol is reportedly 30 per cent cheaper than LPG fuel in Assam which makes it competitive as a cooking fuel. Its clean burning properties also helps reduce indoor air pollution from the combustion of other cooking fuels. Similar projects were also conducted in Nigeria.

METHANOL FUEL FOR COOK STOVES

Generally, methanol is blended with water and additives to form methanol cooking fuel.

The blend usually consists of at least **80% METHANOL**, and approximately **5% ADDITIVES** and **15% OF WATER**. In China, there are two commonly-used and patented formulae for methanol cooking fuel.



STOVES CLASSIFICATION

METHANOL FUEL CAN BE STORED IN

Small portable canisters for smaller cook stoves, and they can also be stored in large cylinders for larger cooking applications.



COOKSTOVES RANGE FROM

Small portable ones to large ones that are used in industrial kitchens in China.



CURRENT DEMAND DRIVERS



CLEANER EMISSIONS
Compared to other fuels, improving air quality in kitchens



Methanol is **WIDELY AVAILABLE**, easy to store and transport



AFFORDABLE alternative fuel



Cook stoves from some manufacturers have **HIGH LEVELS OF EFFICIENCY** that can reduce fuel consumption by up to 40%



SAFE TO USE – there were mishaps a couple of occasion that Chinese kitchens experienced mishaps when using LPG

COUNTRIES USING METHANOL COOK STOVE



INDIA



300 methanol cook stoves were distributed to residents in Assam in a pilot project for methanol as a cook stove fuel. Methanol cook stoves were well-received by residents in the pilot project who noted that the transition was smooth and the food cooked with methanol fuel maintains the same quality. Methanol is also attractive as a fuel for cooking because it is 20% cheaper than LPG in Assam.



TANZANIA

In Tanzania, households use cook stoves that are fueled by ethanol and methanol blends. Methanol is blended up to 20% in ethanol that is leftover from producing Extra Neutral Alcohol for the beverage market. The leftover ethanol used usually has impurities in it and contains higher alcohols which tends to produce smoke and soot when burned in a stove. The blending of methanol effectively reduces soot when burned in a stove, increasing the indoor air quality for households using the blend.



NIGERIA



Many Nigerian households utilized kerosene as a fuel as it was an affordable option in the country. However, this caused to many safety incidents during cooking that has caused to many deaths and burns in the country. Project Gaia, a nonprofit organization, which promotes the use of clean cookstoves introduced methanol cook stoves. Methanol cookstoves were widely popular as they were safe to use, and improved indoor air quality.

FACT

Annually, around 137 billion cubic meters of gas is flared globally. Nigeria alone emits 20 billion cubic meters, producing almost 45% of all Africa's greenhouse gas emissions. This could create enough methanol for every household to cook cleanly throughout Africa.



A CLOSER LOOK AT CHINA

Most of the provinces and cities in China have adopted clear guidelines to transition to the use of cleaner fuels for cooking. These policies have been instrumental in encouraging the use of alternative cooking fuels that have better emission profiles. While natural gas would be compliant with these policies, the infrastructure to transport natural gas is not always available and can be expensive to construct.

Methanol becomes an ideal alternative fuel in such situations as it is widely available in China, and it is also easy to transport as it is liquid at ambient and room temperature.

TIANJIN and **GANSU** provinces have policies that explicitly encourage the use of methanol as a cooking fuel.



GOVERNMENT POLICY DRIVERS

In a bid to curb air pollution, local government have drafted policy encouraging the transition to cleaner fuels in cook stove. In some provinces, specific policy was drafted to encourage methanol stoves. This has led to a policy-driven demand growth in methanol cook stoves in some of these regions.

TIANJIN [Notice on Provisional Regulations on Safety Management and Use of Methanol Fuel and Special Burners in Tianjin \(No. 61 \(2\) \(2010\) of Tianjin Administration of Work Safety\)](#)

There is a ban on the use of 50kg liquefied petroleum gas cylinders as the source of heat in restaurants as well as the promotion of methanol and special burners as alternatives. Restaurant businesses that are located in areas not covered by natural gas pipelines and in areas covered by natural gas pipelines but are not connected to the pipelines (including construction sites, schools, companies and office canteens) are required to install special burners and use methanol.

GANSU [Notice on Pilot Work on the Proper Promotion of Methanol Fuel](#)

Gansu will actively study the introduction of preferential policies to accelerate the development of several methanol cook stove production enterprises, promote and demonstrate in office and company canteens, restaurants and hotels as well as realize the standardization and large scale production of methanol stoves, household methanol storage cylinders and packaged delivery cylinders.



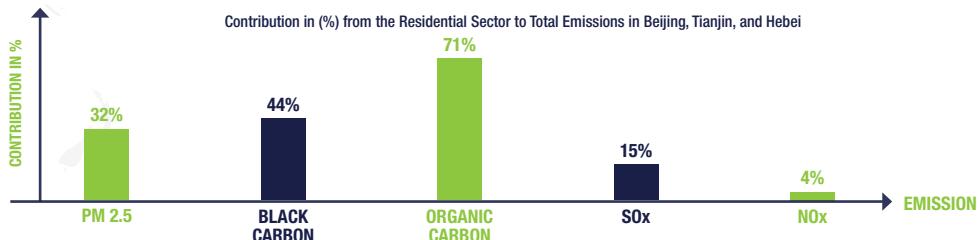
CURRENT CONSUMPTION > 5MMT/YEAR PROJECTIONS TO REACH 7 – 8 MMT/YEAR BY 2022



HOUSEHOLD EMISSIONS LARGE CONTRIBUTOR TO AIR POLLUTION IN CHINA

The residential sector, which includes activities such as cooking and heating, contributes to a large portion of air pollution in China. This is especially so in the Northern region of China which includes Beijing, Tianjin, and Hebei.

Household emissions from the combustion of solid fuels (coal and biomass) in very low efficient stoves result in the following emissions in China's Beijing, Tianjin, and Hebei (BTH) region:



ECONOMIC DRIVERS

FUEL	METHANOL	NATURAL GAS	LIQUEFIED PETROLEUM GAS	DIESEL	COAL	ELECTRICITY
PRICE PER UNIT MASS	¥3.4/KG	¥1.85/M3	¥9.2/KG	¥8.7/KG	¥0.4/KG	¥0.78/KWH
PRICE PER KCAL (¥0.0001/KCAL)	6.4	2.2	8.1	8.6	0.8	9.1
THERMAL EFFICIENCY	56%	75%	50%	40%	30%	80%
ACTUAL ECONOMICS (¥0.0001/KCAL)	11.4	2.9	16.2	21.5	2.7	11.4

Cities like Hefei and Guilin, which do not have specific policies encouraging methanol cook stoves, have experienced a market-driven increase in demand. Situated in Hefei are 2,000 medium-large restaurants, of which 1,200 of them are using methanol cook stoves. Demand growth can be attributed to the affordability of methanol as an alternative clean-burning fuel.



TECHNOLOGY-ENABLED COOK STOVES ANHUI SHENGBAO NEW ENERGY TECHNOLOGY CO.

IOT-ENABLED SYSTEMS



Connected to
CENTRALIZED
DATA PROCESSING/
COLLECTION CENTER
at Shengbao's office



Methanol cook
stoves equipped
with SENSORS &
CONNECTION
to internet



EMISSIONS FROM
COOK STOVES
Enhance safety by
preventing leaks and
monitoring indoor air
quality

SENSORS



FUEL LEVEL SENSORS
Understand fuel consumption
patterns and when restaurants
need resupply of methanol fuel



REMOTE CAMERA
IN KITCHENS
Allow Shengbao to react to
emergency situations with
knowledge of what has
happened in the kitchen

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