

## Improving Energy Pattern



China has maintained rapid economic development since the launch of reform and opening up. However, it has become pressing for us to optimize and adjust the energy structure due to increasing energy demand and environmental issues. The West-East Gas Pipeline Project is of great significance in promoting the optimization and upgrading of China's energy consumption structure, and improving the ecological environment and people's standard of living.



## 1. Guaranteeing Energy Security

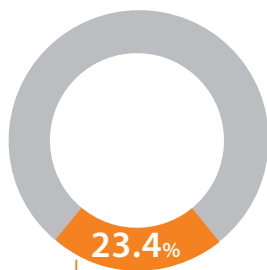
The project has given Chinese markets access to gas from Central Asian, imported LNG and other gas sources, thereby enhancing national energy security, and promoting domestic gas exploration, development and utilization. From 2002 to 2013, China's annual gas production increased by 6.2 billion cubic meters, and the proportion of natural gas in China's oil and gas production in terms of oil equivalent rose from 9.3% in 2002 to 23.4% in 2013. A total of more than 73 billion cubic meters of natural gas has been imported from Central Asia through the pipelines. In 2013, natural gas imported from Central Asia accounted for 16.5% of the total gas consumption in China.

more than **120** cities

Thanks to the West-East Gas Pipelines, natural gas is accessible in more than 120 cities

More than **200** million people

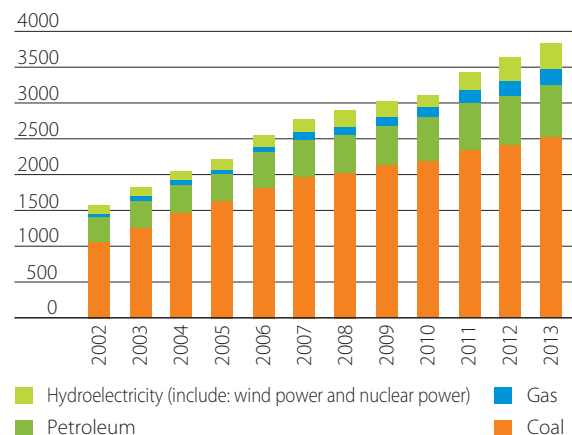
Enjoy the convenience brought by natural gas, bidding farewell to gas tanks



In 2013, about 23.4% of natural gas consumed in China was supplied by the West-East Gas Pipelines

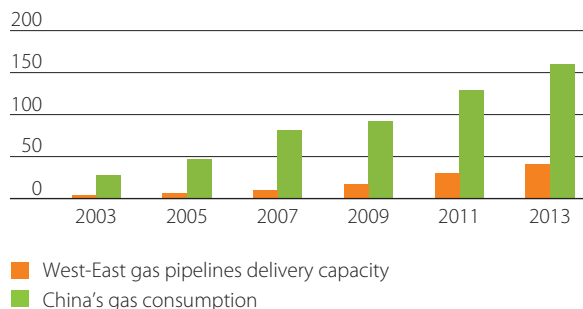
Consumption and structure of China's primary energy from 2002 to 2013

(unit: million tons of standard coal)



West-East Gas Pipeline is playing an increasingly important role in China's natural gas supply system

(unit: billion cubic meters)



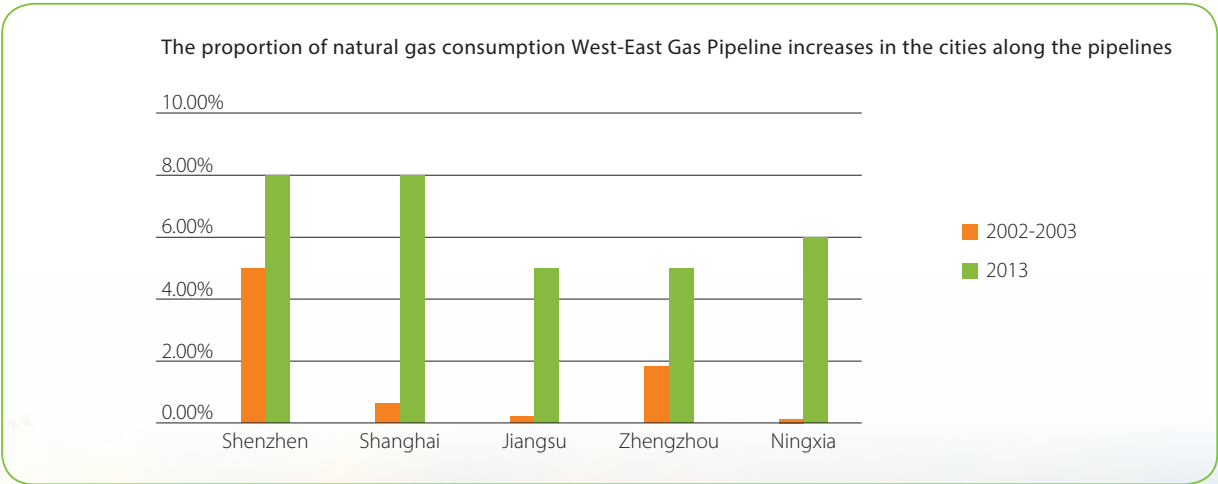
↑ The LNG accepting station in Jiangsu Province



2. Optimizing Energy Mix

Coal accounts for over 70% of China’s total energy supply, and this has led to high air pollutant emissions. To maintain sound and sustainable economic development, China must increase the proportion of clean energy in the energy mix. From 2004 to 2013, the First and Second West-East Gas Pipelines transmitted a total of 180 billion cubic meters of natural gas, accounting for 50% of China’s newly added gas consumption. As a result, the proportion of natural gas in primary energy consumption has increased by 3.4%. After the completion of the Third West-East Gas Pipeline, the proportion of natural gas in national primary energy consumption will further increase by 1%.

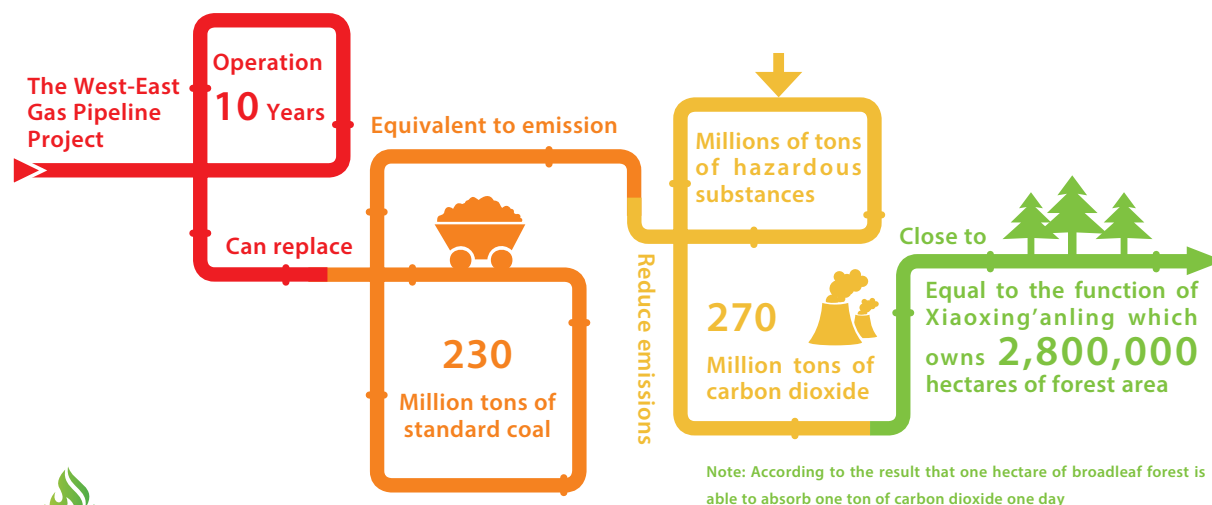
Cities along the pipelines have witnessed a significant improvement in energy structure due to the project. In Shanghai, the project started supplying gas on January 1, 2004, with whole-year delivery accounting for over 50% of gas supply to the city. By the end of 2013, a total of 22 billion cubic meters of natural gas was delivered to Shanghai, with the proportion of natural gas in Shanghai’s primary energy consumption rising by nearly 8% over the decade. The good and excellent air quality rates in Shanghai rose from about 84% in 2004 to 93.7% in 2012.



### 3. Improving the Environment

The West-East Gas Pipeline Project has not only helped increase energy efficiency, but also played an important role in pollution mitigation and treatment. The natural gas transmitted through the First and Second West-East Gas Pipelines can replace 230 million tons of standard coal, equivalent to an emission reduction of millions of tons of hazardous substances and 270 million tons of carbon dioxide.

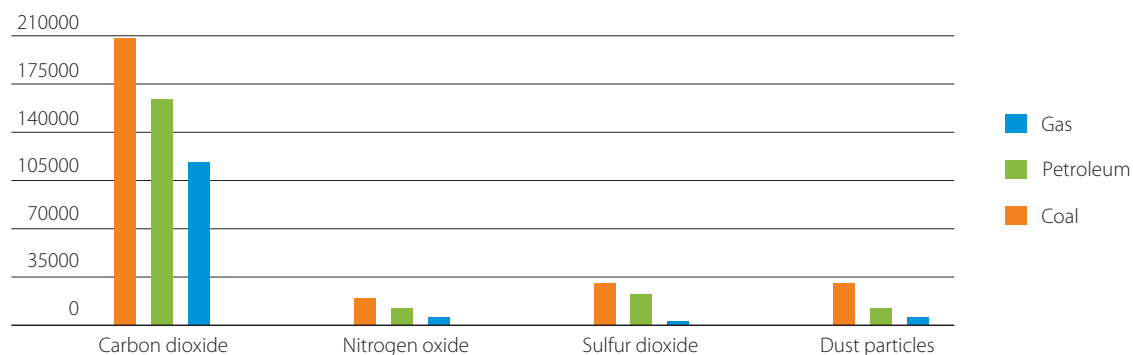
The environmental impact caused by production and people's living activities is gradually reduced due to the increasing gas utilization such as household gas, gas-fired power generation, and replacement of oil with natural gas for vehicles and vessels, and direct gas supply and distributed energy in the chemical industry and other manufacturing industries. In Jiangsu Province, the largest gas user of the project, natural gas has been supplied to 13 cities and districts and 70% of its counties. In Nanjing in particular, PM2.5 emissions have been cut immensely as there are 3.46 million gas users, including more than 3,000 industrial users, and 80% of city taxis are fueled by gas.



#### Tips

For the same amount of energy produced, natural gas emits 56% and 71% of carbon dioxide as coal and oil respectively, and 20% of nitrogen oxides as coal and oil, with emissions of sulfur dioxide and dust particles almost negligible.

Comparison of emissions from natural gas, petroleum and coal (unit: pound/10<sup>12</sup> Btu)



Note: Data sources from EIA, 1998; 1 pound = 0.4536kg; 1 Btu = 1055.056J



## Case Study

### Bringing benefits to enterprises

Enterprises along the West-East Gas Pipelines use natural gas instead of coal gas and coal as fuel and chemical feedstock. This has helped increase their economic efficiency and reduce emissions.

#### Baosteel Special Steel:

##### Producing high-end products with great emission reduction

Baosteel Special Steel used to be under heavy pressure to cut emissions when it made steel with coke oven gas, which generated 2,585 tons of sulfur dioxide, 340 tons of dust and carbon dioxide annually. After the introduction of natural gas, the company removed 149 gas furnaces, reducing 59.5% of sulfur dioxide emissions and 26.8% of soot emissions, with the dust fall index falling by 24.7%. After the closure of coal gas plants, discharge of wastewater was reduced by 480,000 tons, and the emission concentration of pollution factors dropped substantially. As natural gas has a high calorific value and leaves no residual liquid, it is much easier to control the temperature in the steelmaking furnaces. Therefore, the quality of steel produced is more stable. The company has thereby started to produce and process high-end products, such as silicon steel and cold-rolled plates.

#### Jiangsu Huadian Qishuyan Power Generation Co., Ltd.:

##### Economical and environmentally-friendly gas-fired power generation

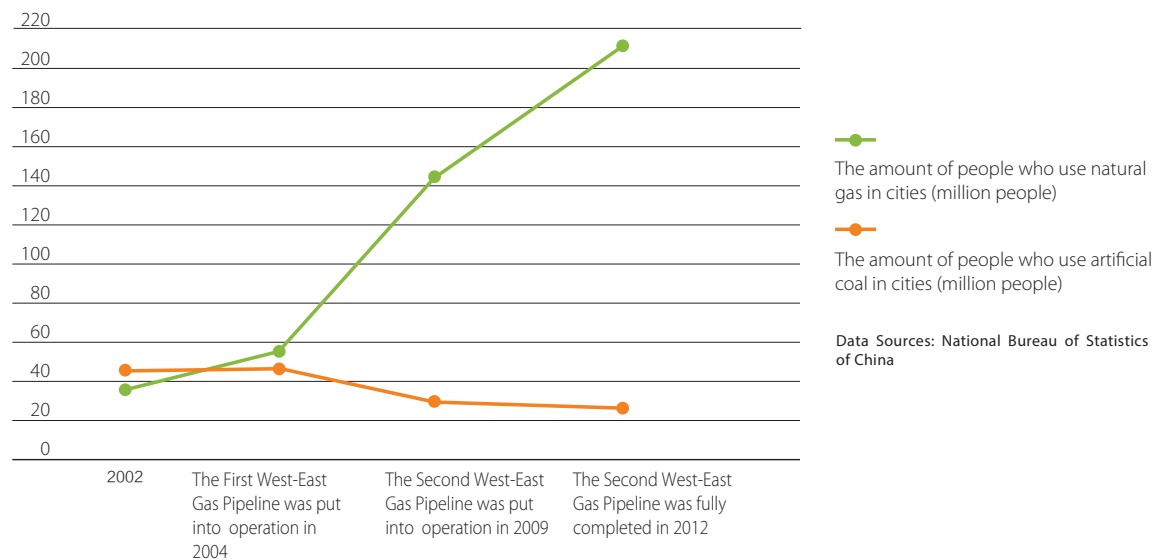
About 7% of the total installed capacity in Jiangsu Province comes from gas-fired power generation, in which, 93% is fueled by gas from the West-East Gas Pipelines. Jiangsu Qishuyan Power Plant is one of the first power plants fueled by natural gas in China. Over the past 7 years, it has generated over 20.8 billion kWh of electric power, cutting coal consumption by 2.3 million tons, and reducing emissions of carbon dioxide by 6.36 million tons, sulfur dioxide by 64,000 tons and nitrogen oxide by 64,000 tons. "Gas-fired power generation plays an important role in increasing energy efficiency. The low NOx emissions have helped us alleviate a lot of environmental pressure", said General Manager Lu Zhiqing.



## 4. Enhancing Quality of Life

With the continuous extension of the West-East Gas Pipelines, among the 600 large and medium-sized cities in China, over 200 have been equipped with a gas pipeline network. Thanks to the project, tens of thousands of families lead a safer and better life, as over 200 million people said farewell to firewood, briquettes, and gas tanks, and now use natural gas for cooking, bathing, and heating.

The West-East Gas Pipeline Project boosts city resident's consumption of natural gas







**People living in the cities and towns along the pipelines have benefitted from the convenience brought by natural gas.**

**Resident in Linhu Residential Quarter in Yinchuan, Ningxia:**

Now with natural gas, we do not need to move the gas tank upstairs and downstairs. Natural gas is very convenient, sanitary and affordable.

**Resident in the residential quarter of fertilizer plant in Shangshui County, Zhoukou City, Henan:**

In the past when we used briquettes, it was very hard to clean the dirty ground in the narrow kitchen. Nowadays, it is very clean and tidy, because we use natural gas. In addition, it is very convenient. I don't need to carry briquettes upstairs any more, which was really hard and dirty.

**Resident in Donghuan New Village, Suzhou, Jiangsu:**

Natural gas burns well and heats fast. When we used coal gas in the past, the pot would become dark instantly, and a pot can be used for only one or two years. Now, with natural gas, a pot can be used for 5-6 years, and it does not become as dark as black charcoal.

**Owner of a restaurant in Datian County, Fujian:**

We used to use bottled gas, it was very expensive and unsafe. Now, we have natural gas! As we have many customers, we used to spend thousands of yuan for fuel every month. Now, with natural gas, we have greatly cut down the costs. For the same amount of energy produced, natural gas is nearly 50% cheaper.

**Zhouya, former deputy director of Shanghai Municipal Development & Reform Commission:**

Coal gas mainly contains toxic carbon monoxide, while natural gas mainly contains non-toxic methane. Ten years ago, coal gas was widely used in over 6 million households in Shanghai, resulting in more than 30 gas poisoning incidents every year due to its insecurity. In 2013, the accidents are reduced by two-thirds.

