

# Breakthrough in combustible ice

Successful gas hydrate test exploration and mining trials give China an edge as clean energy frontrunner

By ZHENG XIN and ZOU SHUO

China's success in mining gas hydrate in the South China Sea is a breakthrough that could revolutionize the global energy industry and prove more significant than the United States' shale gas, experts said.

The gas hydrate, commonly known as combustible ice, is perhaps another 15 years away from commercial use, but its successful mining in China is a breakthrough nevertheless, said Lu Hailong, a professor at the Institute of Ocean Research, which is part of Peking University.

Lu was the chief scientist for the first mining trial for gas hydrate.

According to Li Jinfa, deputy director of the China Geological Survey, the South China Sea has an estimated 80 billion metric tons of oil equivalent of gas hydrate reserves.

In all, there are 100 billion metric tons in the Qinghai-Tibet Plateau and in the South China and East China seas.

Combustible ice is formed under low temperature and high pressure in permafrost. One cubic meter of the hydrate can release about 160 cubic meters of gas, which would emit only half the amount of carbon dioxide produced by oil or coal.

No country has been able to produce it commercially due to tough conditions and pollution concerns.

"With ample experience accumulated, China has become the frontrunner in gas hydrate mining technology," Lu said.

China completed its first test



Chinese technicians check their combustible ice mining equipment during an on-the-spot operation in the Shenhu area of the South China Sea, 320 kilometers southeast of Zhuhai in South China's Guangdong province. GUO JUNFENG / CHINA DAILY

exploration in the South China Sea on July 9, which lasted 60 days. Total output exceeded 300,000 cu m and daily output surpassed 5,000 cu m.

According to Lu, a longer, more productive trial is possible by 2020 in the South China Sea.

Beginning May 10, a trial was carried out in waters 320 kilometers southeast of the Pearl River estuary. It achieved better-than-expected results, according to the China Geological Survey Bureau, which is under the Ministry of Land and Resources.

The exploration collected 6.47 million sets of experimental data and set

world records in both the duration of experiment and total amount of gas extracted, said the bureau.

Jin Qinghuan, an academician with the Chinese Academy of Engineering, said China will complete the initial preparatory work by 2020 and begin commercial production by 2030.

Successful trials have given China an edge in mining in silt sand seabed, making it a forerunner in mining for clean energy, he said.

Japan made headway in 2013, but large amounts of sand that entered the production wells halted its progress.

The US has been researching the clean fuel for years, but has made no significant progress due to technological barriers.

Lu said solid research and development, and breakthroughs, are needed to increase output from the next trial, to make combustible ice lucrative. Safety issues, production sustainability, environmental impact and political concerns are key factors.

China is eager to replace conventional energy, including coal, quickly with clean energy sources, to optimize the energy structure and relieve problems caused by energy shortages.

According to Han Xiaoping, chief information officer of China Energy Net Consulting, combustible ice has great potential and could well be China's next big opportunity in energy.

"The total volume of organic carbon in the world's combustible ice is twice that of all other known energy sources combined, including coal, oil and natural gas," he said.

"As the mining site is near Guangdong province, a region with robust economic development, there will be plenty of demand for the natural gas extracted from the wells and the cost of liquefaction and transporting will also be relatively low due to the short distance."

According to Lu, the frequent and fierce typhoons in the South China Sea were the biggest obstacle to the first test drilling operation.

The team was lucky to overcome the difficulty, thanks to the 118-meter-tall Blue Whale 1 oil exploration platform built by China Yantai CIMC Raffles Offshore, he said.

According to Han, China leads the world in marine oil and gas drilling technology, and bigger drilling platforms will be built to integrate oil and gas exploration so as to lower the production cost of combustible ice.

China started research on the energy source in the late 1990s. Its first gas hydrate samples were collected in the South China Sea in 2007.

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## >> FROM PAGE 12

is close to \$1.64 billion. Of that, \$704 million, or 43 percent, came from China on the back of the Belt and Road Initiative.

For instance, construction of the first stage of the Hungary-Serbia railway, China's first rail line in Europe, will start in November.

Prior to the railway line, China had completed the 250-million-euro Zemun-Borca bridge across the Danube, and its approach roads in Belgrade, Mihajlovic said.

"China's investment helped us to improve infrastructure facilities and created job opportunities. More importantly, we are very grateful for the technologies and training opportunities that our Chinese partners bring to us," said Mihajlovic.

"The decision to participate in the Belt and Road Initiative is one of the most important ones we've ever made, and we will definitely continue to be involved in it."

According to Mihajlovic, in the past 40 years, Serbia has tried but failed to find partners in Europe to begin new

projects in its energy sector.

Now, the government is in talks with a Chinese company to start the country's largest hydropower station.

"The grand initiative needs boldness of vision but should also be implemented in a way that could moisten things silently," said Xu Li, marketing director in the Western Balkans for YTO International, a Chinese tractor manufacturer.

With years of experience in expanding overseas, Chinese enterprises have been attaching much importance to building better relations with local staff and integrating with local people.

HBIS Serbia, for instance, increased staff salaries by 8 percent soon after the acquisition. It also set up a special fund to help staff going through difficult times.

The company's top management visited retirees during traditional local holidays and offered them gifts. In August, they gifted stationery to staff with children, as schools were to reopen in September after the summer holidays.

"We also encourage the staff to advise us on how to improve the working process and management," said Song.

This year, HBIS Serbia will invest heavily in environment protection and energy-saving techniques. "We want to preserve a good environment for the local people," Song said.

HBIS is not the only Chinese company to ride the Belt and Road Initiative to touch millions of lives. Sinohydro, a Chinese infrastructure builder, is another shining example.

In August 2015, the Macedonian city of Tetovo was caught in a rainstorm that led to a serious landslide, leaving some villages isolated.

Sinohydro's branch office in the capital, Skopje, organized a rescue team quickly and pressed into service heavy machinery in the stricken areas to clear a road, thus establishing a communication link to the isolated villages.

Liu Zhichao, who headed the rescue team at that time, recalled that a senior Skopje citizen invited Sinohydro's Chinese staff to his home.

They enjoyed pizza for lunch, standing in the hot sun. The old man offered grapes, cola and beer.

"We paid lots of attention to communicate with the local government and communities while constructing the project," said Wang Jianfeng, manager of Sinohydro's Skopje branch office, which is executing the Kicevo-Ohrid motorway project.

The hills along the project, for instance, often experience droughts during summer, so the branch office has paid for the digging of open wells for the locals.

And during local festivities, company staff get into the spirit by offering gifts to villagers and passing on best wishes to the local government, Wang said.

Such efforts, Wang said, can help cement relations. Kicevo's singing and dancing group, for instance, visited the project for a performance during the Chinese lunar new year.

Zvonko Sarafiloski, 51, manager of a food-processing factory, said Sinohydro's project in Kicevo is good for locals, particularly young people, as

it has created employment. Prior to the project, the locals had limited job opportunities and low incomes.

Since 2014, however, the Kicevo-Ohrid motorway project has offered a new life to local people.

"We have money not only for bread but meat, cheese, candy, alcohol and even new phones and laptops," said Sarafiloski. The motorway project also helped expand local businesses. More and more new grocery stores, restaurants and supermarkets were set up.

"Our life is easier now. We hope Sinohydro can get new projects, so that our young boys and girls can work with Chinese engineers for a longer time."

According to Ling Shengli, secretary-general of the International Security Research Center at China Foreign Affairs University, if two nations want to come closer, the process has to start at the level of people.

People need to come together, heart-to-heart, first. Only then will there be closer ties, said Ling.