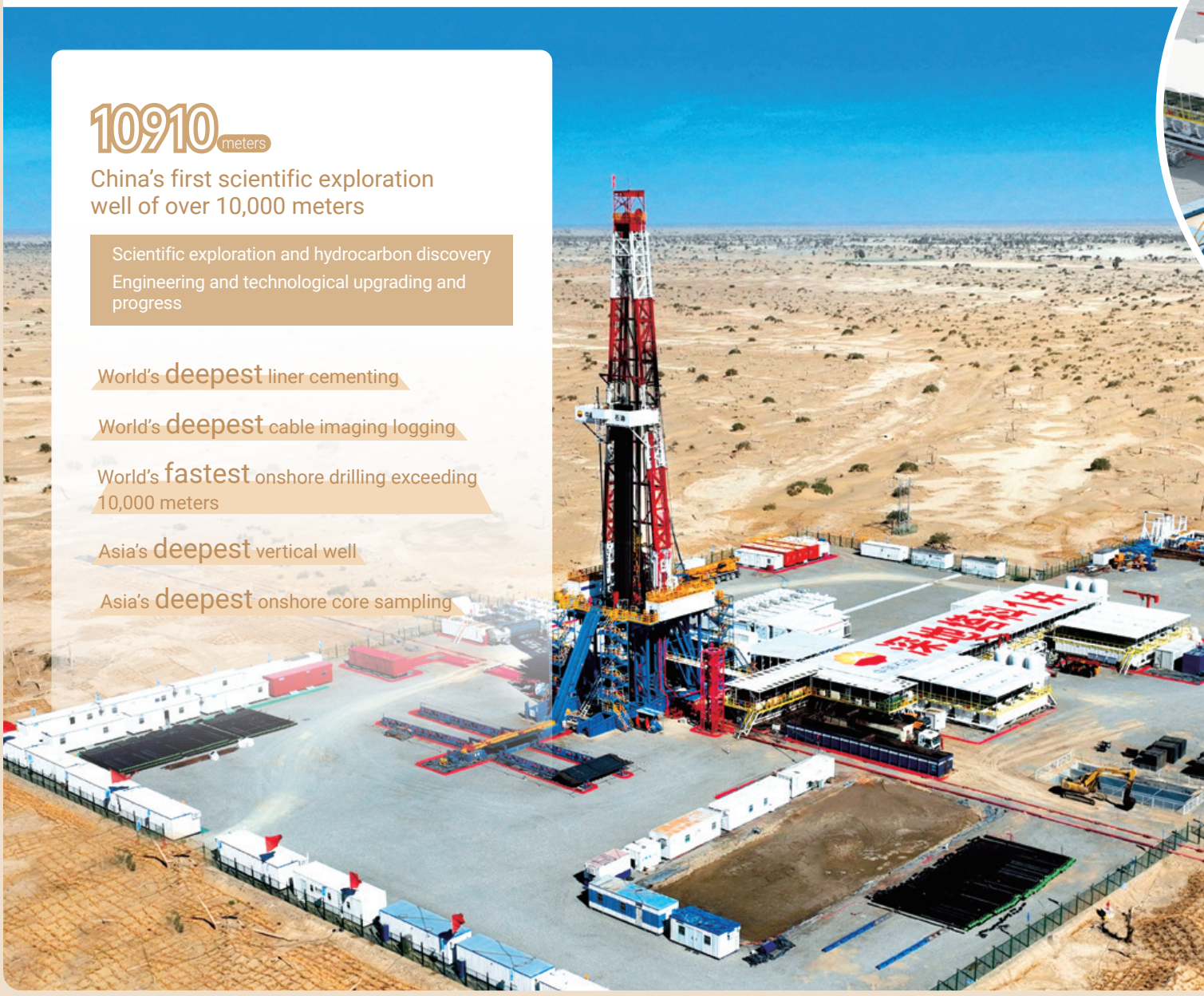
TOPIC

DETERMINED TO CONDUCT DEEP-EARTH EXPLORATION AT 10,000 METERS AND BEYOND

Well Shenditake 1, completely drilled at 10,910 meters, becomes China's first scientific exploration well at depth over 10,000 meters, and Asia's first and world's second deepest vertical well. The well has set five records: the world's deepest liner cementing, the world's deepest cable imaging logging, the fastest onshore drilling exceeding 10,000 meters, Asia's deepest vertical well, Asia's deepest onshore core sampling. It is a major breakthrough in deep earth exploration after achievements made in deep space and deep sea exploration.



10910 meters

China's first scientific exploration well of over 10,000 meters

Scientific exploration and hydrocarbon discovery
Engineering and technological upgrading and progress

World's **deepest** liner cementing

World's **deepest** cable imaging logging

World's **fastest** onshore drilling exceeding 10,000 meters

Asia's **deepest** vertical well

Asia's **deepest** onshore core sampling

The drilling of Shenditake 1 started on May 30, 2023, and has been committed to scientific exploration and hydrocarbon discovery, as well as engineering and technological iteration and upgrading, based on the important instructions of President Xi Jinping on "deep earth exploration", "energy security", and "energy supply stabilizer", etc. It is a landmark project for building a national strategic scientific and technological force, and is in the high ground of world energy and chemical innovation.

Well Shenditake 1 successfully drilled the first core sample in China from a depth of over 10,000 meters. The world's first discovery of oil and gas at a depth of 10,000 meters on land also enriched and improved our geological understanding of deep earth oil and gas resources.

"The successful completion of Shenditake 1 represents significant progress in the entire chain of basic theories and key core technologies in China's deep earth 'well engineering', which is a great breakthrough leading the world forward."

——CAE Academician Sun Jinsheng

Drilling progress of Well Shenditake 1

- May 18, 2023: Drilling rig set up
- May 30, 2023: The drilling started
- June 3, 2023: Drilled to 1,000 meters in 4 days
- July 27, 2023: Drilled to 5,856 meters
- October 25, 2023: Drilled to 8,000 meters
- December 16, 2023: Drilled to 8,849 meters
- December 25, 2023: Drilled to 9,000 meters
- March 4, 2024: Drilled to 10,000 meters
- January 5, 2025: Drilling completed at 10,910 meters

It took 279 days to drill to 10,000 meters, and nearly another 300-plus days to drill the last kilometer. We faced challenges such as overloading, wellbore instability, tool failure and formation leakage. In particular, the drill pipe was seriously weakened as conventional drilling tools and sensors failed due to the extreme hardness of the formation, resulting in a load into the well as high as 665 tons.

Shenditake 1: World's fastest 10,000-meter drilling

- Designed well depth: 11,100 meters
- Designed drilling & completion cycle: 457 days
- Drilled through 12 strata
- Every meter (after reaching 10,000 meters) is met with unprecedented difficulties
- It took humans 300 years to drill only about 0.2% towards the core of the earth
- Wells at a depth of over 6,000 meters are called ultra-deep wells
- It took us 29 years to drill to 8,000 meters from 7,000 meters
- A 15-year period was used from 8,000 meters to 9,000 meters
- Only 3 years were taken from 9,000 meters to 10,000 meters and beyond

Facing these world-class challenges and extreme challenges, CNPC has joined hands with tens of thousands of people from both domestic and foreign enterprises, research institutions, and universities to develop ten technological tools, including the world's first 12,000-meter automated drilling rig on land and the integrated design technology of geological engineering, and formed an independent and controllable key and core technology system for 10,000-meter exploration, boosting the iteration and upgrading of a series of key equipment, tools and materials for deep earth drilling in the country.

Meanwhile, with these key and core technologies and equipment, CNPC has successfully handled numerous complex underground situations, continuously drilling through 12 strata of different lithologies and pressure systems, and eventually encountering rocks dating back over 500 million years. This has established CNPC's leading position internationally in the field of engineering technology at depths of 10,000 meters.

According to Wang Chunsheng, chief expert of Tarim Oilfield and well manager of Shenditake 1, "The successful drilling of a 10,000-meter well is of so much importance. It marks that China's key and core equipment and technologies for ultra-deep well drilling have passed the test of the extremely harsh working conditions at 10,000 meters. It not only enriches the engineering technology series in China's drilling engineering field, but also provides a solid equipment guarantee for pushing the limits of deep earth exploration and developing ultra-deep oil and gas resources."

CNPC unswervingly cultivates new quality productive forces and accelerates the breakthrough in deep earth oil and gas exploration and development. By the end of 2024, the Company has drilled 191 wells at depths of 8,000 meters in the Tarim Basin, fully ensuring national energy security.

What does it mean to have the first discovery of hydrocarbon indication at 10,000 meters?

"According to traditional theory, in very deep and very old strata, there is no reservoir space and oil and gas cannot exist stably. But the discovery of oil and gas in a 10,000-meter well proves the opposite. This will greatly enhance our determination and confidence to advance deep into the Earth, which is of great significance for ensuring national energy security."

——CAS Academician Hao Fang