2023 Industry Review

Changes unseen in a century were unfolding at a faster pace across the world in 2023. The combined impact of multiple factors, e.g., a lack of momentum in global economic growth, the Ukraine crisis, the Palestinian-Israeli conflict, unilateral sanctions, trade barriers, climate change, and extreme weather, led to the misalignment of global energy resources and increased market volatility. The global political and economic landscape was increasingly divided into camps and regions and the competition between major countries resulted in decoupling of supply chains in the energy industry and, in turn, caused an enormous shock to the stability of the international energy market and the security of the industry chain. As the global energy environment experienced profound changes, energy security became a priority issue for the energy development in all countries. Amid changes of the world, of our times, and of the historical trajectory, the readjustment to energy mix picked up the pace in China, aiming to improve energy resilience, promote the complementarity between traditional energy sources and new energies, increase energy reserves and system backup and build a market-oriented, intelligent and coordinated energy governance system. With a new round of strategic prospecting getting under way, the energy demand-supply balance remained stable and orderly as a whole and the foundation for energy supply was further strengthened.

2023 Global Oil and Gas Industry

Global GDP growth fell to 3% in 2023, from 3.5% in 2022. Global energy consumption growth slowed down due to an economic downturn. Globally, primary energy consumption was 14.61 billion tons of oil equivalent, up 1.7% from 2022, with an increase of 0.5 percentage points.

Sustained rise in global E&P spending, oil and gas production.

Following a sharp increase in global E&P spending in 2022, oil companies were cautiously optimistic about upstream investment in 2023 as international E&P spending increased by 12% year-on-year to $575.1 billion, the growth of which is lower than the previous year. In particular, E&P spending in Central Asia - Russia regions registered negative growth, down 4.4% year-on-year. 242 oil and gas discoveries of 11.44 billion boe were made globally, averaging at 47.29 million boe. There was a remarkable drop in the average size of discovery as the number and volume of discoveries decreased, hitting a new low in the past five years. Four biggest discoveries in 2023 exceeded 500 million boe, three for natural gas and one for oil; two were onshore discoveries in Iran, one in Indonesian deep waters and one in Guyana deep waters.

Both oil and gas production rose in 2023 globally. Global oil production reached 4.45 billion tons, an increase of 70.9 million tons or 1.6% year-on-year; global natural gas production rose 0.8% year-on-year to 4.28 tcm. The United States, Russia and Iran remained the largest natural gas producers.

Global refining capacity continued to increase as ethylene prices remained subdued.

In 2023, global refining capacity rose to 5.18 Bt/a with a net increase of 59.425 Mt/a, which was slightly lower than the increase in 2022. Capacity additions were mainly found in the Middle East, North America and China. Global crude runs amounted to approx. 82.4 million b/d and returned to 2019 levels. Global refinery utilization rose to 80% from 78.6% in 2022. Refinery utilization rates in OECD countries declined to

varying degrees in contrast to a significant increase in Asia and the Middle East. Global gasoline, diesel and fuel oil yields continued to fall as jet fuel yield increased.

Global ethylene capacity growth slowed down significantly and totaled 228 Mt/a, adding 5.323 Mt/a or up 2.2% year-on-year. Average utilization rates rose slightly for ethylene plants from 83.1% to 83.8% and ethylene production reached 189 million tons, up 5.5% year-on-year. Ethylene prices remained subdued as spot ethylene in North America, Northwest Europe and Northeast Asia fell by 29%, 14.6% and 18%, respectively, from the previous year.

Global natural gas prices receded from high levels.

In 2023, thanks to the fading effects from geopolitical premiums, international gas prices fell sharply and the natural gas market recovered slowly with an easing supply-demand balance. Global natural gas consumption growth picked up and reached approx. 3.96 trillion cubic meters, up 0.5% year-on-year. In particular, natural gas consumption recovered steadily in Asia Pacific at a rate of about 1.8%, while the growth rate slowed to 1.2% in North America and fell by about 6.2% in Europe. As the US production increased and Russian decreased, the global natural gas output grew by 0.8% to 4.28 tcm. The global natural gas trade volume stood at 1.25 tcm, a decrease of 1% year-on-year; the trading market continued to evolve, with more Russian pipeline gas off the European market and Asia leading the LNG growth. The total LNG capacity increased by 0.9% to 457 million tons per year, hitting a ten-year low. The three major natural gas markets all witnessed falling prices to the pre-Ukraine crisis levels; the average prices of European TTF spot, Northeast Asian LNG spot and US HH spot all went down to $12.9/MMBTU, $15.8/MMBTU and $2.54/MMBTU, by 65.8%, 54.4% and 60.5% year-on-year respectively.

Global energy mix changed with the green and low-carbon transition.

In 2023, global energy consumption witnessed a downward trend in fossil fuels and an upward trend in non-fossil fuels. Global coal demand hit another record high but the growth rate slowed, with demand growth mainly coming from emerging economies in Asia. Oil demand growth was slowing due to higher penetration of electric vehicles and the improvement in energy efficiency. Fossil energy consumption rose slightly by 1.1% with the share of fossil fuels in primary energy demand fell to 79.7%, below 80% for the first time, or 0.6 percentage points lower from the previous year. Non-fossil energy consumption increased by 4.1% as Asia Pacific and Europe led the global growth in non-fossil energy consumption. Non-hydro renewable electricity capacity (mainly wind and solar) increased rapidly by more than 430 million kilowatts and totaled more than 2.5 billion kilowatts, up 20% year-on-year. Electricity generation from non-hydro renewable sources exceeded 4,700 TWH. In 2023, global clean energy investment stood above $1.7 trillion, up more than 20% from 2021. This momentum was led by renewable power (mainly wind and solar) and EVs, with important contributions also from other areas such as lithium batteries, heat pumps and nuclear power.

2023 China's Oil and Gas Industry

In general, domestic energy supply and demand were stable and orderly in 2023. Coal production continued to grow; oil and gas reserves and production increased significantly with oil and gas production stood at 200 million tons; natural gas production exceeded 230 billion cubic meters, marking an over-10-billion-cubic-meter increase in gas production for the seventh consecutive year; crude oil production grew steadily; domestic energy prices remained generally stable. Meanwhile, China's energy transition was on the fast track. Renewable electricity capacity reached 1.47 billion kilowatts, accounting for more than 50% of the total power generation capacity in China and outrunning thermal power capacity for the first time in history. New energies such as wind and solar showed strong momentum.

Oil and gas reserve and production maintained growth and deep-water, deep-layer and unconventional resources emerged as a new growth driver.

In 2023, domestic oil and gas companies increased E&P efforts and delivered remarkable results in terms of reserve growth and efficient development. Newly proven oil reserves were approx. 1.3 billion tons and newly proven gas reserves were nearly 1 trillion cubic meters. Crude oil production and natural gas production reached 209 million tons and 235.3 billion cubic meters (including shale gas, coal-bed methane and coal-based synthetic natural gas) respectively. Advances in E&P theories, technologies and equipment supported major breakthroughs in deep-water and deep-layer exploration and production. Exploration: Exploration in deep and ultra-deep layer, offshore deep-water, and unconventional resources registered good results and a number of breakthroughs were made in new fields and plays, new sags in mature fields and new strata. A major breakthrough in deep coal-bed methane exploration opened up a new field of reserve growth. Production: Deep and ultra-deep layers became a new driving force for production growth; a number of large deep-layer oil and gas fields were developed efficiently; continental shale oil brought a revolution in the oil industry and reached a new high in production, indicating a good prospect for the development of unconventional oil resources in China.

Refining/chemical capacity in expansion with “increase in oil and decrease in chemical”.

Domestic oil refining capacity was on a slightly upward trend, adding 12 Mt/a in 2023. The total annual refining capacity rose to 936 million tons, ranking first in the world. Industrial concentration was higher and refinery sizes further expanded. The number of 10 Mt/a refineries nationwide rose to 36, from 35 in the previous year, amounting to 522 Mt/a in total and accounting for 55.8% of China's refining capacity. Driven by soaring demand for refined products and regulation of the market, a number of key production and operation indicators picked up significantly. In particular, crude runs reached 738 million tons, up 8.6% year-on-year; refinery utilization hit a record high at 78.9% with an increase of 5.3 percentage points; gasoline, diesel and kerosene production amounted to 444 million tons, up 11.1% year-on-year; the refinery margin increased by RMB 70 to around RMB 360 per ton.

In 2023, China's petrochemical feedstock capacity for ethylene, propylene and para-xylene and three primary synthetic materials ramped up for the fifth consecutive year, all ranking first in the world. Ethylene capacity totaled 51.95 Mt/a, adding 2.42 Mt/a. Propylene capacity added 7.29 Mt/a to reach 63.34 Mt/a. Para-xylene capacity added 5.7 Mt/a to reach 42.1 Mt/a. The capacity of synthetic resin increased 13.42 million Mt/a to 115 Mt/a; synthetic rubber capacity increased 350,000 tons/year to 7.2 Mt/a; Synthetic fiber capacity added 5.43 Mt/a. The rapid expansion of production capacity led to the overall loose supply and demand of most chemical products, with little profits for ethylene, propylene and synthetic resin and even losses for certain products.

Natural gas consumption recovered with fast growing supply.

In 2023, domestic natural gas consumption grew rapidly year-on-year, with the recovery of the economy, the falling LNG prices, and the demand for gas power supplements. Domestic natural gas production increased by 5.7% (12.6 bcm) to 235.3 bcm, a seven-year rise of more than 10 bcm. Natural gas imports also grew by 9.5% to 165.6 bcm. China's LNG receiving capacity reached 116 Mt/a, exceeding 100 Mt/a for the first time.

Energy consumption continued to increase as the green and low-carbon transition gathered pace.

In 2023, China's primary energy consumption totaled 5.72 billion tons of standard coal, up 5.7% year-on-year. In particular, non-fossil energy accounted for 17.7% of total energy consumption, up by 0.2 percentage points from the previous year. Driven by various factors such as policy, market and technology, new energies, e.g., wind and solar, grew significantly, marking a leading position in the world in terms of capacity, technology and cost. In 2023, photovoltaic capacity added 216.88 million kilowatts, up 148.1% year-on-year. Wind power capacity added 75.9 million kilowatts, up 101.7% year-on-year.

In 2023, China's energy consumption per unit of GDP was 0.45 tons of standard coal/RMB 10,000, basically flat from the previous year. China's carbon dioxide emissions per unit of GDP had fell significantly by 34.4% since 2012, and in 2022 the carbon emission intensity was significantly reduced by more than 51% from 2005; the forest coverage reached 24.02% in the country.

Source: *2023 Report on Oil and Gas Industry Development* by CNPC ETRI