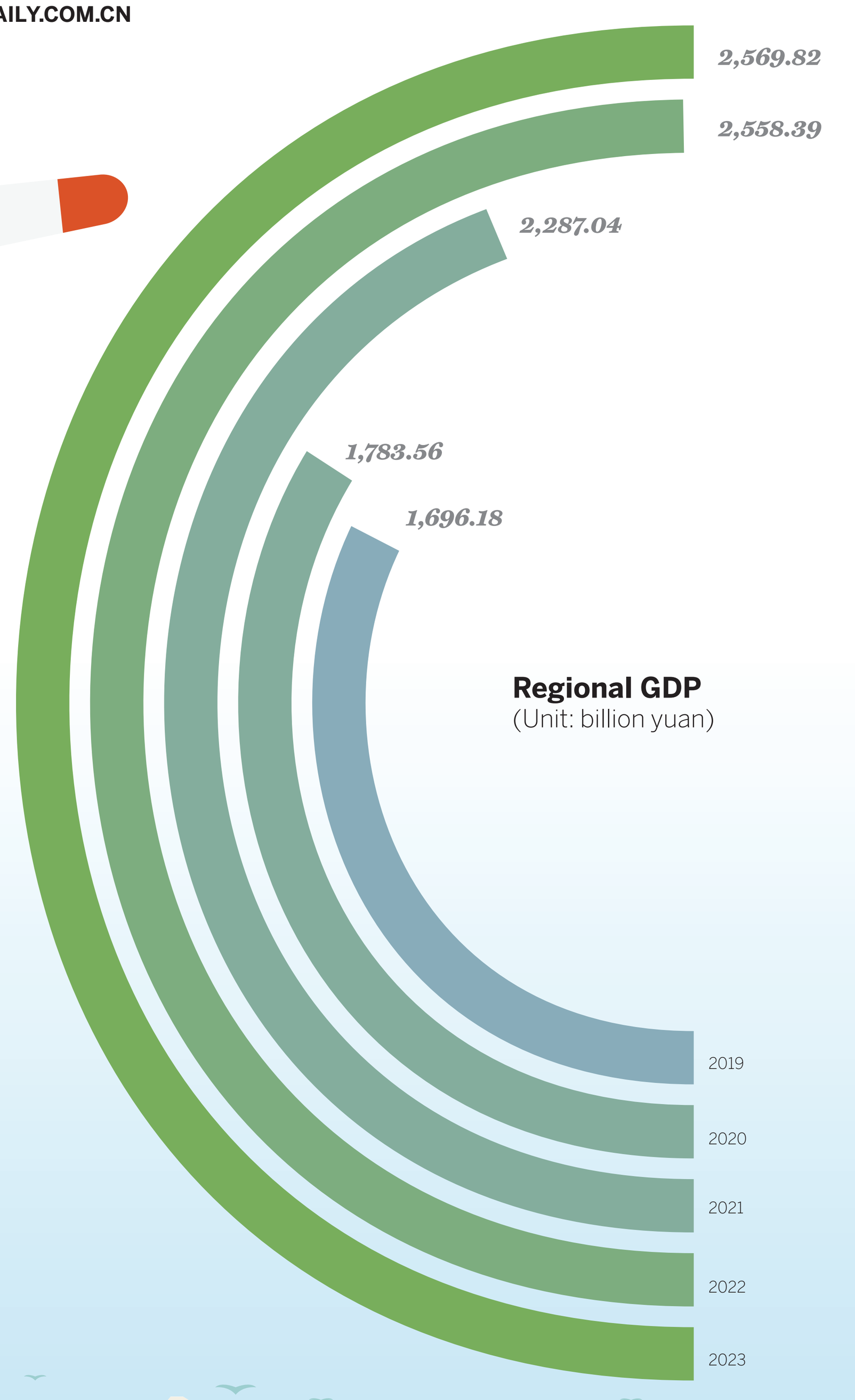
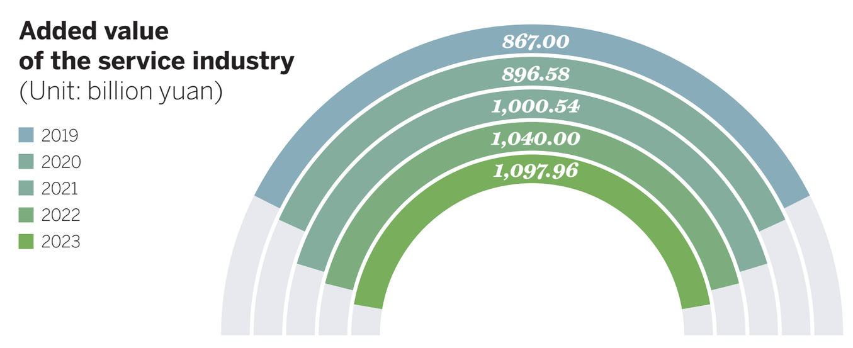
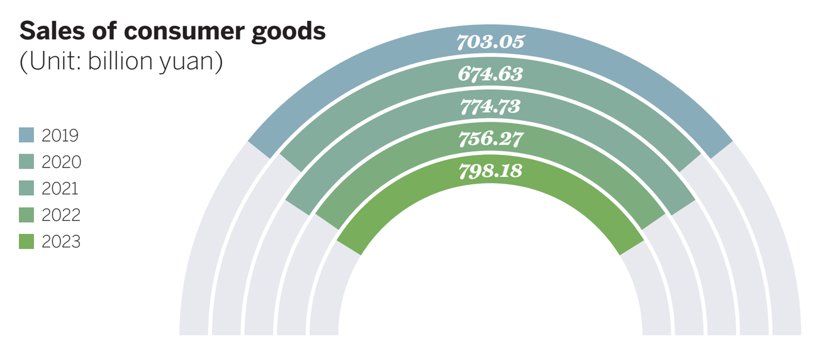
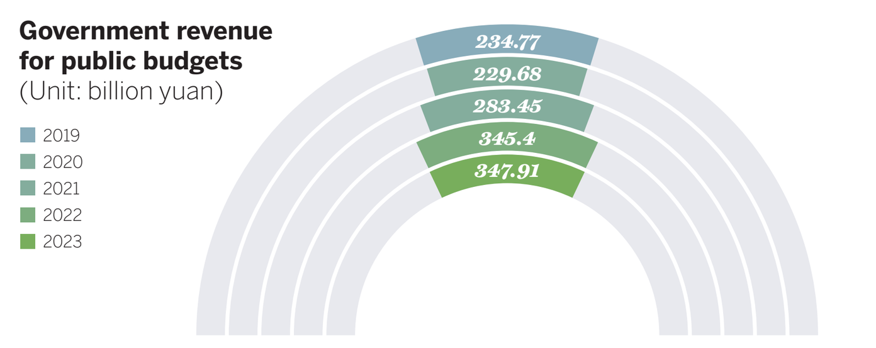
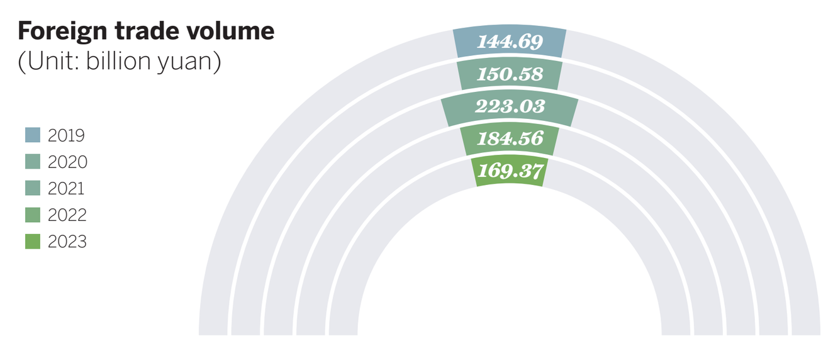
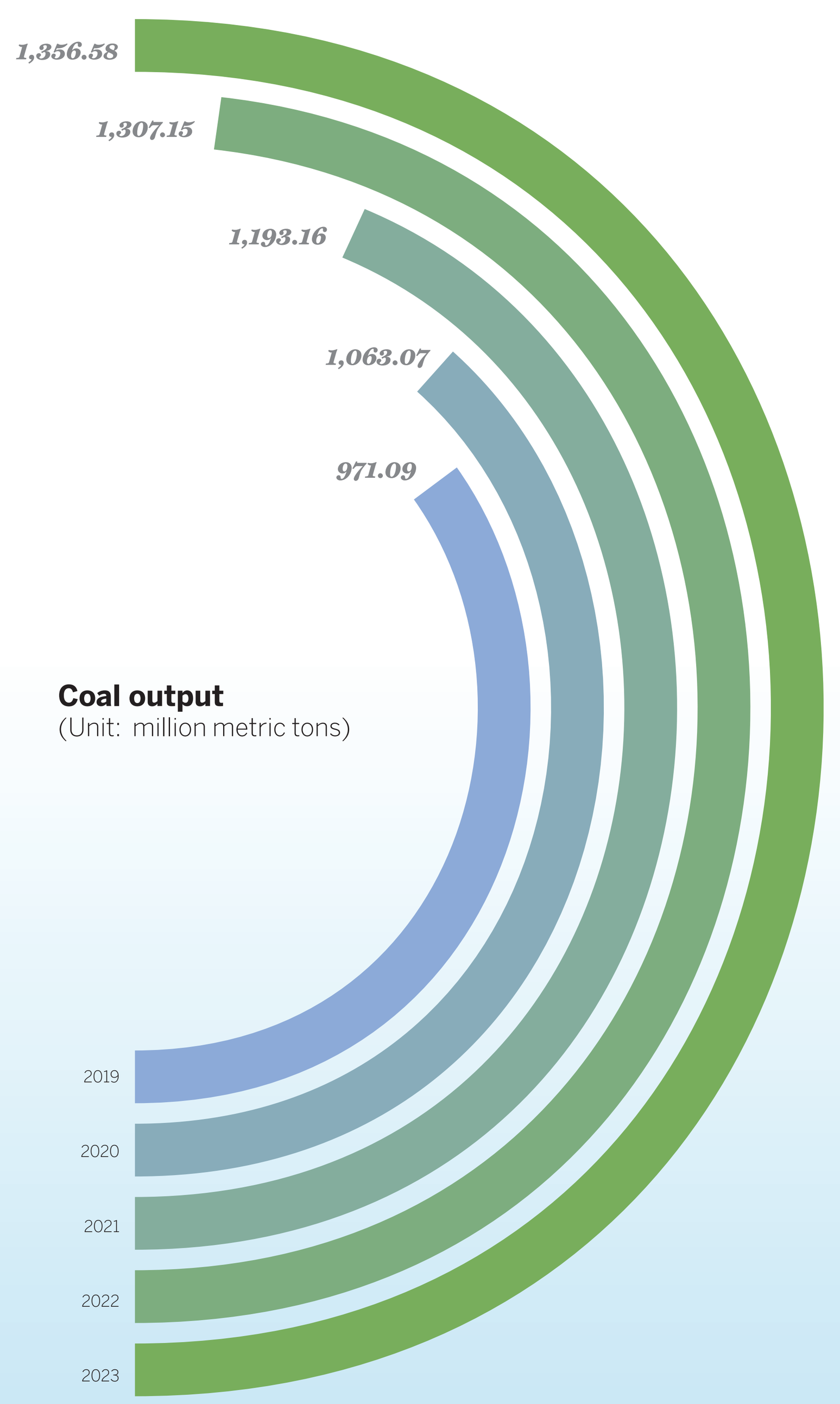












GREEN SHANXI

Province famous for coal mining embraces eco-friendly power, diversified industries and opening-up

By YUAN SHENGGAO

The North China province of Shanxi, which used to be an economy dominated by coal mining and related heavy industries, is now entering an era of green, sustainable, diversified and high-quality development.

What makes this change possible is an economic transformation that features campaigns to reduce its reliance on coal and other traditional resources; fostering strategic emerging industries as new drivers of local growth; implementing local strategies such as developing a pilot zone for the nation's energy revolution; an experimental zone for the ecological protection and high-quality development of the Yellow River drainage basin; a base for advanced manufacturing and a highland for the opening-up in China's central regions.

In this economic transformation, there are many examples that local industry insiders and residents can take pride in.

Liu Lizhou is a resident in the eastern Shanxi city of Yangquan. He bought an electric car last August.

"My fellow residents told me that this new car features a substantial improvement in charging speed than its previous versions and many of its rivals," Liu said.

He added that what makes him proud is that the battery pack — the core component of the car — is made by local company Huayang.

Huayang Group is a Fortune Global 500 company. It used to be a leading coal-mining company in Shanxi with a presence of more than 70 years in the industry. The sodium-ion battery pack that Liu mentioned is developed and produced by Huayang's subsidiary, Huana Xinneng Technology.

According to an executive of Huana Xinneng, a sodium-ion battery features lower production costs, higher safety, better resistance to low temperature and a longer life cycle compared with other types of batteries. It can be widely used in industries such as large-scale energy storage, low-speed electric vehicles and 5G base stations.

"More importantly, the anode material of the battery is extracted from anthracite," said the executive. "Huayang Group boasts the largest anthracite production base in China and this is where our advantage lies."

Huana Xinneng began to produce sodium-ion batteries in early 2019. Now it is one of the few producers in the world to have an annual capacity of 1 gigawatt-hours of such batteries.

It is also China's first enterprise with operations covering the entire industry chain — ranging from material production, battery manufacturing, packing and integration to other applications. For this achievement, the company has been recognized as one of the top 10 innovative enterprises in China's sodium-ion battery industry.

In the past, coal mining and coal-fired power generation were the dominant tasks of Huayang Group. Responding to Shanxi's economic transformation strategy, which focuses on upgrading traditional coal-mining and related facilities and cultivating emerging industries, it began to diversify into new energy and other emerging industries about a decade ago.

Its other subsidiary, Huachu Photovoltaic, for instance, is now a major supplier of solar power-generation and energy storage components to domestic solar power-generation companies.

"We are the leading supplier of such components to domestic heavyweight power-generation companies like Huaneng, Huadian, State Power Investment and CHN Energy," said an executive of Huachu Photovoltaic.

Statistics from Huayang Group show that operations other than coal and power generation now account for more than 70 percent of the group's revenue. Its operations also include nanofiber filtering materials, production of carbide with coalbed methane as a raw material and manufacturing of biologically degradable materials.

Like Huayang Group's Huana Xinneng, there are a number of enterprises in Shanxi engaged in the battery industry with innovative technologies and techniques.

Zhongke Meijin Carbon Materials, for instance, is producing activated carbon for battery capacitors with cornstarch as a raw material.

"With cutting-edge technologies, we have turned cornstarch, which is sold at 3,000 yuan ($414) per metric ton, into the high-end activated carbon that can be sold at 300,000 yuan a ton," said an executive of the company.

Another company, Lanke Tuxin New Material Technology, uses polyethylene powder to produce insulation film for lithium batteries. According to the company, the film, with a thickness of 5 micrometers, is the thinnest that can be domestically produced, thus breaking the monopoly of overseas suppliers in the domestic market.

Among the emerging industries, the burgeoning new energy sector represents a vital force for Shanxi's economic transformation and high-quality development.

This is a result of the province's energy revolution campaign. While focusing on developing new energy resources like wind and solar power, it is upgrading the traditional coal-mining industry toward cleaner, more efficient and safer operations.

Shanxi province, especially its northern part, boasts rich wind and solar power resources.

In the northern Shanxi city of Datong, the development of wind and solar energy is carried out along with the control and improvement of coal-mining subsidence areas.

For example, inside the shafts of depleted coal mines surrounding the city, refilling projects are taking place to prevent possible geological risks. At the same time, huge wind turbines and expanses of photovoltaic panels are emerging on the ground above such shafts.

With these facilities, Datong is developing a large solar and wind power base with an installed power generation capacity of 6 million megawatts.

According to local officials, such a capacity makes Datong one of the top solar and wind power bases in China. They estimate that the base can transmit 27 billion kilowatt-hours of "green" electricity to its neighboring regions of Beijing and Tianjin municipalities, as well as Hebei province, every year when it reaches its designed operational scale.

And it's not only in Datong, wind and solar farms can be seen throughout the province.

Local reports said that 26 counties in Shanxi are promoting the development of "rooftop solar farms" and "roadside solar farms". These scattered facilities have a combined installed power generation capacity of 200,000 kW and have generated more than 100 million kWh of electricity to date.

Even at the numerous coal mines in Shanxi, operators are developing another clean energy resource — coalbed methane — along with traditional coal mining.

Coalbed methane is a form of natural gas. Its thermal value is one to four times higher than coal of the same weight. Almost no exhaust gases are produced after coalbed methane combustion, according to industry insiders.

However, coalbed methane presents a danger inside mines. It can explode if the concentration of the gas reaches 5-16 percent. Safe extraction of the gas can help to avoid coal-mine accidents by reducing its concentration. The extracted coalbed methane can then be used as a clean energy resource.

Shanxi is one of the provinces in China with rich coalbed methane resources. The province's proven geological reserves of the gas in an underground depth of less than 2,000 meters have reached 8.31 trillion cubic meters, accounting for nearly one-third of China's total, local statistics showed.

Shanxi is also a national leader in the safe mining and use of the gas. Statistics from the Shanxi Energy Bureau show that the province's total output of coalbed methane reached 3.07 billion cu m in the first quarter of this year, increasing 11.8 percent year-on-year and accounting for 80.8 percent of the national total.

The development of multiple new energy resources has led to a substantial improvement in the energy sector's industrial structure and the local environment in Shanxi.

According to data from State Grid Shanxi Electricity, the electricity generated from new and clean energy resources now accounts for 25.2 percent of Shanxi's total.

The company's executives said the ratio of green electricity is expected to grow at a fast pace in the future with more new energy facilities in place or under construction. Its latest statistics show that Shanxi's installed generation capacity of wind and solar power projects reached 51.64 million kW, accounting for 38.48 percent of the province's total.

Building a highland for opening-up in China's inland regions is another strategy for Shanxi's high-quality development.

The initiative is made possible through increased transport connections across the world, especially with countries and regions involved in the Belt and Road Initiative.

On March 28, a train loaded with 55 containers of cargo left Taiyuan's Huanghouyuan Railway Station for the Russian capital of Moscow. It was the first train between Shanxi's provincial capital and Moscow and the latest addition to the China-Europe freight train service in the province.

Just about a month before that departure, the eastern Shanxi city of Yangquan on Feb 26 saw off its first international freight train bound for Belarus.

Shanxi, which has positioned itself as a new hub for opening-up in inland China, has been developing the China-Europe freight train service since 2017.

There are more than a dozen routes for the service, departing China via such land ports as Manzhouli and Ereenhot in the Inner Mongolia autonomous region and Alataw and Khorgos in the Xinjiang Uygur autonomous region.

Shanxi's freight train service toward Laos and other regions in Southeast Asia started in March 2022.

The number of freight trains from Shanxi to Europe, Central Asia and Southeast Asia has been increasing year-by-year, from 10 trains in 2017 to 185 trains in 2020. On Aug 5, 2023, Shanxi witnessed the departure of the 700th international freight train, which was bound for Central Asian countries.

The international train services have contributed greatly to promoting international trade and business cooperation for Shanxi, local officials and industry insiders said. They added that developing international logistics passageways through China's international railways can push the boundaries of the inland province.

Shanxi has developed a number of land ports and logistics parks to serve international freight trains. These include Zhongding Logistics Park in Jinzhong and Fanglue Logistics Park in Houma, as well as others in the cities of Taiyuan, Datong, Yangquan, Changzhi, Jiexiu and Xiaoyi.

Smart tech harnessed to bring old trades into 21st century

By YUAN SHENGGAO

Shanxi is promoting an industrial transformation campaign to upgrade its traditional coal mining and related heavy industries, as well as to diversify its economy by fostering emerging industries.

This seems a difficult mission considering the local economy has been dominated by coal mining for many decades.

However, the rapid development of new sciences and technologies, especially digital and intelligent technologies, is now offering an efficient solution.

At 500 meters underground, robots monitor mining in Xinyuan Coal Mine of Lu'an Chemical Group based in the southeastern Shanxi city of Changzhi. Assisted by 5G technology, the automated inspectors send real-time data to the mining company's control center to monitor safety.

Xinyuan became China's first 5G network-connected coal mine in 2020. Mining managers can view operational situations in 32 underground working scenarios, including coal cutting, conveying, ventilation and gas concentration, via the smart system.

As a pilot in China's coal-mining industry digitalization, Xinyuan has turned four mining shafts and 15 coal-cutting sites into smart facilities.

Tashan Coal Mine, a subsidiary of Shanxi's energy giant Jinneng Holding Group, is another example of smart mining.

In the coal mine's central control room, operators sit by desks with arrays of computers, surrounded by walls of display screens.

With just one click on the computer, underground coal cutters, conveyors and equipment are immediately plugged in. Their real-time images and data flicker across the screens, pumping the coal — which is always referred to as "black gold" — up to the planet's surface.

When talking about the changes brought by smart coal mining, Zhang Xing, an executive of Tashan Coal Mine, said he feels a revolution is occurring.

"We have realized intelligent coal cutting in seven shafts, ensuring a coal recovery rate of up to 90 percent," he said. "This is also increasing safety and improving the in-shaft environment along with a rising efficiency."

Mining workers are the ones most pleased with the improvements in efficiency and safety in their workplaces brought by mining digitalization.

Guo Jinchao, a worker in Jinxinda Coal Industry, a branch company of Shanxi Coking Coal Group, had been working in underground mine shafts for many years.

But now he is working at a control center above the ground, skillfully controlling various mining equipment via a remote operational system.

"The system makes automation possible for coal cutting and conveying," Guo said. "The number of laborers for one shift has been reduced from eight to four and the production efficiency has also increased by 50 percent."

According to Miao Huanli, deputy chief of the Shanxi Energy Bureau, Shanxi was home to 118 smart coal mines and 1,491 smart coal-mining shafts by the end of 2023. The majority of the coal output in the province is now produced by these advanced facilities.

A recent document released by the bureau said that Shanxi will have a total of 200 smart coal mines by the end of this year. It added that all coal mines there will have smart operations by 2027.

In addition to coal mining, related industries like coking and power generation are going smart with the application of digital technologies.

The coking unit of Jinnan Steel Group based in the city of Linfen is an example of the coking industry upgraded with smart technologies.

With the application of digital technologies, the group's coking production is now controlled by an integrated control center. With such a center, a company executive said the laborious coking process, including coal loading, coking, coke quenching and coke unloading, can be virtually controlled by one person with the push of a button.

In addition to the energy industry, almost all sectors in Shanxi are going smart with the help of digital technologies.

Huaxiang Group based in the city of Linfen is an advanced manufacturer of precise metal components for a variety of industries. In 2023, it established its 5G-connected industrial internet network to empower its operations.

"The network has covered all our three industrial parks and is connected with more than 3,000 sets of manufacturing equipment," said Wang Yuan, president of the company. "This allows the automation of all the operational processes, like purchase, production, safety, quality control, sales, equipment maintenance and management of human resources and costs."

In the production facility of automaker Geely in Jinzhong city, digitalized production has contributed to a substantial improvement in efficiency, allowing the completion of a new energy car in 90 seconds at its general assembly plant.

Digitalization has also brought fundamental changes to the agricultural industry.

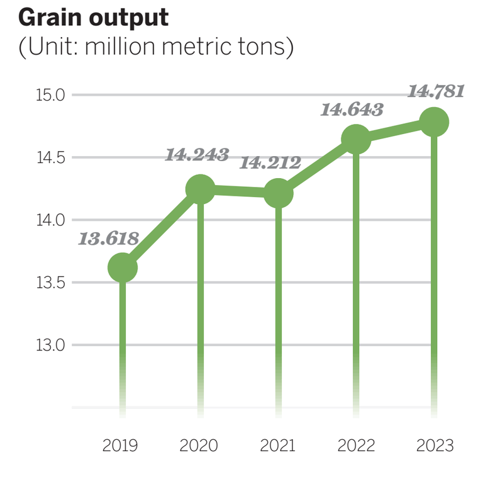
Gao Zhiqiang, a researcher from Shanxi Agricultural University, for instance, has led a team of agronomists from his university to offer technological services to farmers in the county of Yicheng. Digitalization is part of the solutions the team offers to farmers.

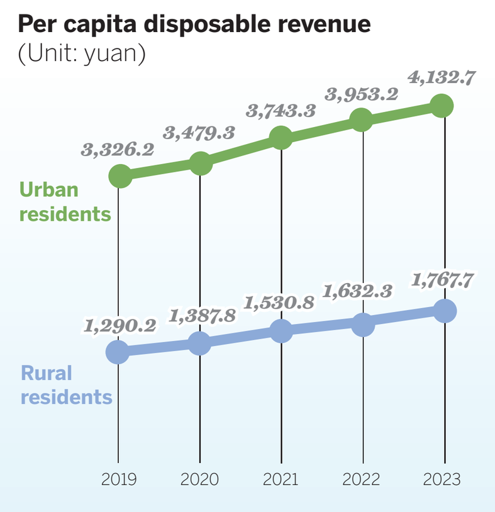
During the summer wheat harvest season in 2023, a farm in Yicheng's Dongguan village — which his team took care of — reported a per-hectare yield of 12.39 metric tons, breaking the record for wheat farming in Shanxi province.

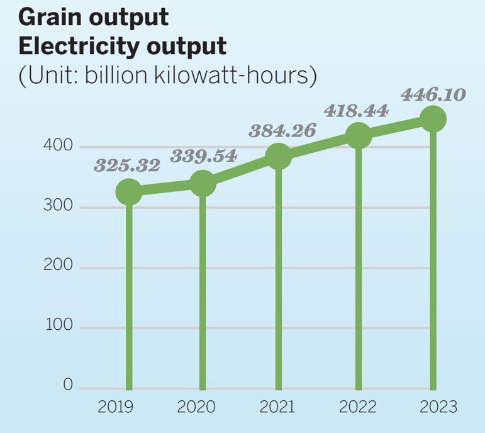
Gao said the team's bid to improve output is based on analysis of data collected from the farming process.

The scientist said the most effective way to increase output and improve quality is the proper use of water and fertilizers. This can be calculated according to the digitally monitored conditions of the farm, such as soil moisture and the level of nutrition in soil, as well as light and heat exposure.

In Shanxi, digital technologies have been widely applied to the tourism, medical care, urban traffic management and administrative service sectors, bringing convenience to local residents and tourists alike.







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