航天宏图信息技术股份有限公司
PIESAT Information Technology Co., Ltd.

Remote sensing satellite

Beidou satellite

Communication satellite

Unmanned aerial vehicle

PIE-Engine

PIE-UAV PIE-Check PIE-MTInSAR PIE-Hyp PIE-Map PIE-DEM PIE-SAR
PIE-Ortho PIE-Basic PIE-Geoent PIE-SIAS PIE-Lidar PIE-AI PIE-Smart

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PIESAT Information Technology Co., Ltd.

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Address：PIESAT Building (Building No.4), No.2 Cuihu North Ring Road, Haidian District, Beijing, China

hotline：400-890-0662   Website：www.piesat.cn

2024
PIESAT ANNUAL
ESG REPORT

About this Report

Reporting Purpose

This Report is intended to conduct a frank and honest exchange with stakeholders regarding the ESG concept, practice performance and other aspects of PIESAT Information Technology Co., Ltd., and systematically respond to the expectations and appeals of stakeholders.

Reporting Period

This Report covers a period from January 1 to December 31, 2024, but part of it may exceed the above-mentioned period to make it more comparable and complete.

Reporting Cycle

This is an annual report, which is issued simultaneously with the Company's annual report.
The English version of the 2023 ESG Report is disclosed at the same time. In case of any ambiguity in the understanding of it, the Chinese version shall prevail.

Data Description

The data sources used in this Report include the Company's internal statistics and public data from government departments and third-party institutions.
The recording currency of the financial data in this Report is the Renminbi ("RMB").

Scope of Reporting

This Report covers PIESAT Information Technology Co., Ltd. and its main subsidiaries.

Reference

In this Report, "PIESAT Information Technology Co., Ltd." is referred to as "PIESAT" or "the Company".

Basis of Preparation

China National Standard GB/T36001-2015 *Guidance on Social Responsibility Reporting*
International standard ISO26000:2010 *Guidance on Social Responsibility*
United Nations 2030 Sustainable Development Goals (SDGs)
GRI Standards by Global Sustainability Standards Board
Guidelines on Corporate Social Responsibility Reporting for Chinese Enterprises (CASS-CSR4.0) issued by the Chinese Academy of Social Sciences
Guidelines for the Preparation of the "Report on Corporate Social Responsibility" by the Shanghai Stock Exchange
Guidelines for Environmental Information Disclosure of Listed Companies by Shanghai Stock Exchange

Reporting Form

The electronic version of this Report is available on the websites of the Shanghai Stock Exchange (www.sse.com.cn) and CNINFO (www.cninfo.com.cn).

Contents

President's Statement

As the year turns its course and a new era begins, we look ahead to the hopeful and opportunity-filled year of 2025 at this auspicious moment of renewal and rejuvenation. On behalf of the Board of Directors of PIESAT, I would like to extend my most sincere appreciation and best wishes to all colleagues who have stood with the Company through thick and thin, to our valued customers who have placed their trust in us, to our ecosystem collaboration partners who have collaborated with us for mutual benefit, and to our investors who have shown care and support for the Company!

In 2024, the Company encountered unprecedented difficulties and challenges. Market growth expectations were subdued, effective demand remained inadequate, bottlenecks persisted within the domestic economic cycle, and the external environment proved to be both complex and challenging. In the face of these adverse circumstances, the Company promptly made strategic adjustments. All employees united their efforts and forged ahead with determination, not only securing a lifeline for the Company in adversity but also instilling a resilient and unyielding spirit that will underpin the Company's future development.

Adversity can breed greatness. In 2024, the Company achieved remarkable accomplishments amidst challenges that garnered nationwide attention. The "Nuwa Constellation" project progressed smoothly, with the successful launch of the second and third batches of eight radar satellites, bringing the total number of radar satellites in the network to 12. The "Nuwa Constellation" has become the largest radar remote sensing constellation in China and the second largest globally, playing a significant role in such fields as national land mapping, disaster prevention and mitigation, and natural resource regulation. The Company's core competitiveness, both domestically and globally, has been further strengthened, marking a significant milestone for China's commercial aerospace industry on the world stage. Businesses in natural resources, water conservancy, meteorology, oceanography, agriculture, environmental protection, forestry and grassland, emergency response, and Beidou navigation, among others, seized incremental opportunities to grow and expand. Special industries also forged ahead in adversity and achieved commendable results. The Company leads the nation in research and development (R&D) capabilities for the "Tianquan large model", advanced remote sensing algorithms, and remote sensing artificial intelligence. The data scale and service capabilities of PIE-Engine have continued to improve, and the unmanned aerial vehicle system serves the low-altitude economy more professionally. The Company's development has attracted high attention from Beijing Municipality, earning it a place on three of Beijing's top 100 enterprises lists.

Adversity is temporary while development remains the eternal theme. The accelerating recovery of the Chinese economy will inevitably bring opportunities to the commercial aerospace industry. According to statistics, the gross domestic product (GDP) grew by 5% year-on-year in the first three quarters, indicating a steady and progressive economic performance with an unchanged fundamental trend of long-term improvement. We must bolster our confidence and resolve. The 2024 Government Work Report proposed for the first time to develop new growth engines such as commercial aerospace and the low-altitude economy, with industries like satellites and UAVs receiving unprecedented attention and strong support from governments at all levels. In 2024, the *Private Economy Promotion Law (Draft)* was open for public consultation nationwide, heralding the imminent introduction of China's first fundamental legal document serving the private economy. China's emphasis on and protection of the private economy have reached a new height. The law will ensure that the Company gains more opportunities for fair competition, a more robust investment and financing environment, and more comprehensive support for technological innovation in the future. The 2024 Central Economic Work Conference proposed strengthening counter-cyclical adjustments and implementing proactive fiscal and prudent monetary policies, which has undoubtedly injected an impetus into the Company's business expansion and accelerated receivables collection. The *Medium and Long Term Development Plan for National Civil Space Infrastructure (2026-2035)* is about to be released, and it is expected that China will further step up its support for commercial aerospace enterprises in top-level design, industry access, sharing and co-construction, and international cooperation.

In 2025, the Company will place greater emphasis on compliant operations, strengthen collective decision-making, and refine its quality management system. It will firmly establish itself in the downstream market, driven by business demands and guided by the development of the "Nuwa Constellation", to promote deep integration across the entire industrial chain and achieve high-quality development. Regarding the development of the "Nuwa Constellation", the Company will accelerate the financing efforts for subsequent satellites and maintain its leading position in PIE remote sensing software and data services. In terms of market expansion, the Company will vigorously tap into domestic and international data service markets and channels, and expedite the establishment of an internal circulation between constellation development and data services. In industry services, the Company will continue to consolidate its advantages and maintain rapid growth in such sectors as natural resources, water conservancy, meteorology, oceanography, agriculture, environmental protection, forestry and grassland, emergency response, and Beidou navigation. It will further optimize other business lines, including special industries, to achieve steady progress. In quality and compliance management, the Company will strengthen its sense of responsibility and mission, adhering to the bottom line and avoiding any breaches of regulations. In corporate culture development, the Company will uphold a people-oriented philosophy and take multiple measures to enhance employees' sense of identity and belonging.

The essence of commercial aerospace lies in the relentless pursuit of technological innovation and operational efficiency. To evolve into a pure and remarkable commercial aerospace enterprise, PIESAT must undergo rigorous market tests and master the ability to rise from the ashes. Reform inevitably comes with short-term pain, but failing to reform leads to prolonged suffering. The space age is on the horizon, and we are embarking on a grand endeavor. I hope that every PIESAT employee will remain steadfast in their belief in and support for the Company, contributing to the achievement of our mission and vision, as well as the realization of China's space dreams. Together, let us write a remarkable chapter in this journey.

I sincerely wish all friends and colleagues success in your careers, happiness in your families, and the fulfillment of your dreams!

PIESAT Information Technology Co., Ltd.

President's Signature
April 2024

Company Profile

PIESAT Information Technology Co., Ltd. (stock code: 688066), founded in 2008, is a leading satellite internet company in China and among the first batch of listed enterprises on the Science and Technology Innovation Board (or STAR Market). The Company has researched and developed the PIE (Pixel Information Expert) software—the remote sensing and geographic information integrated software with fully independent intellectual property rights (IPRs), and possesses PIE-Engine—the first remote sensing and geographic information cloud service platform in China, thus realizing the domestic production of the basic software of remote sensing. Furthermore, the Company has planned for the "Nuwa Constellation", the largest commercial radar satellite constellation in China, enhancing operational capabilities throughout the entire satellite industry chain. Additionally, the Company has established a nationwide UAV production and service system, aiming to create integrated "Air-Space-Ground" service capabilities. The Company has provided government, businesses, universities, and other relevant departments with comprehensive solutions for spatial information applications, including foundational software products, system design and development, and remote sensing cloud services.

Headquartered in Beijing, the Company has more than 100 branches across the country and has set up research and development (R&D) centers in Xi'an, Chengdu, Wuhan, Nanjing, Changsha, etc. Now the Company has more than 2500 employees, including over 90 employees with a doctoral degree, over 750 employees with a master's degree, and over 200 talented overseas returnees and industrial experts. Among them, engineering technicians account for more than 80%. The Company has established a postdoctoral workstation, collaborated with Academician Yue Qingrui's team to create an Academician Workstation for Urban Emergency Management Satellite Applications, and set up 1 Beijing Municipal Engineering Laboratory, and 2 key laboratories and 4 engineering & technological innovation centers under the Ministry of Natural Resources of China. The Company holds qualifications including National Key High-tech Enterprise, Dual-Software Enterprise (software product certification and software enterprise certification), CMMI Level 5, Class-A Surveying and Mapping Qualification, CS4 Certification for Information System Construction and Service Capability, Engineering Consulting Credential, General Aviation Business License, and Civil UAV Pilot Training Institution Certification. The Company also owns more than 400 patents for inventions and over 1200 software copyrights. PIESAT received more than 20 provincial and ministerial-level awards. In 2022, PIESAT was recognized as a National Enterprise Technology Center by five ministries and commissions, including the National Development and Reform Commission.

01 Nuwa Constellation

PIESAT is currently developing the largest commercial radar remote sensing constellation in China, known as the "Nuwa Constellation," with plans to launch 114 remote sensing satellites. The goal is to achieve global rapid revisit observations and integrated communication, navigation, and remote sensing services, driving China's earth observation capabilities to a leading position globally. As of December 2024, the "Nuwa Constellation" completed the networking of 12 radar remote sensing satellites, achieving a global revisit period of as short as six hours. It has delivered immense value in such fields such as land surveying and mapping, disaster prevention and mitigation, and natural resource regulation. Currently, the "Nuwa Constellation" is ranked as the premier radar remote sensing constellation in China and the second largest globally.

02 Unmanned Aerial Vehicle System

PIESAT independently develops and manufactures a range of small and medium-sized UAV platforms, including fixed-wing, composite-wing, tilt-rotor, electric multi-rotor, long-endurance gasoline-powered multi-rotor, and UAV swarm systems. These platforms are capable of operating in diverse environments such as urban areas, lakes, high-altitude plateaus, and forests. The Company offers a wide range of external services, including UAV sales, UAV flight services, data processing services, application scenario services, operation training, and qualification certification services. PIESAT UAV, together with the "Nuwa Constellation," forms the backbone of the Company's integrated "Air-Space-Ground" perception capabilities, leveraging spatiotemporal data to empower the digital transformation of traditional urban industries and enhancing the digital governance capabilities of governments through spatiotemporal data. Currently, PIESAT is selecting locations across the country to establish UAV production bases and application service centers, building a comprehensive UAV service network across China.

| **2008** founded in | **2500** more than employees | **750** over employees with a master's degree | **1200** over software copyrights |
| **100** more than branches | **90** over employees with a doctoral degree | **400** more than patents for inventions | |

03 PIE Remote Sensing Software

PIESAT has always adhered to the principles of independent control and technological innovation for its core products, and has spent 14 years developing the PIE remote sensing software. PIE offers integrated solutions for accessing, preprocessing, intelligently analyzing, outputting thematic products, and conducting virtual simulations of multi-source optical, radar, and electromagnetic payload data. It serves as a highly automated and user-friendly platform for remote sensing engineering applications. Upon evaluation by a panel of academicians and experts, PIE is deemed to have reached an overall advanced international standard, with several of its technologies setting global benchmarks. With technological expertise accumulated through versions 1.0 to 6.0, PIE has evolved from desktop and cluster editions to a cloud service edition, forming a product portfolio comprising "one cloud, one globe, and one set of toolkits." In November 2020, the Company officially launched the PIE-Engine, aiming to rival Google Earth in the United States and establish a new "open+collaborative+shared" model to build a domestic remote sensing application cloud service ecosystem. Additionally, the Company has leveraged cutting-edge technologies such as visual large models and artificial intelligence content generation to develop the PIE-Engine GPT "Tianquan" large vision-language model for remote sensing. This model provides users with efficient, accurate, and highly generalized intelligent remote sensing cloud services, including intelligent interpretation of remote sensing images, intelligent enhancement, and 3D reconstruction services.

04 Application Services

Building on its proprietary foundational software platform and core technologies, PIESAT has independently undertaken and participated in a wide range of major national strategic projects. The Company serves multiple industries and sectors, including natural resources, ecological environment, emergency management, meteorology, oceanography, water conservancy, and agriculture, offering system consulting and design, as well as comprehensive analysis and processing of remote sensing information across all processes and elements. This supports government agencies in implementing refined regulations and making informed decisions. For corporate clients in finance and insurance, precision agriculture, energy and power, transportation, and other sectors, the company provides air-space big data analysis and information services. Additionally, it offers services such as automatic target recognition, precise navigation and positioning, and environmental information analysis to other relevant sectors.

05 Mission and Vision

PIESAT takes "Transforming the World with Technology, Bringing Remote Sensing into Everyday Life" as its core mission. Guided by the socialist core values of "Serving Customers Wholeheartedly, Pursuing Grand Aspirations Together," the Company practices scientific management, fosters innovation and development, and enhances its core competitiveness to achieve innovative breakthroughs in multiple fields. By establishing scholarships and grants, the Company promotes talent development in universities and practices corporate values with compassion, giving back to society with concrete actions. While maintaining stable business performance, the Company focuses on providing sustained and reasonable returns to investors. PIESAT is dedicated to collaborating with friends at home and abroad for mutual benefit and win-win outcomes, striving to realize the grand vision of "Let the Chinese Remote Sensing Software PIE Serve the World!"

Organizational Structure

In 2024, to enhance the overall strength of the Company and align with market opportunities and current business conditions, PIESAT established the Emergency and Digital Government Business Group, the Meteorological, Marine and Agricultural Business Group, and the Water Conservancy Division, with a focus on building a management system with a strong front end, robust middle platform, and efficient back-end.
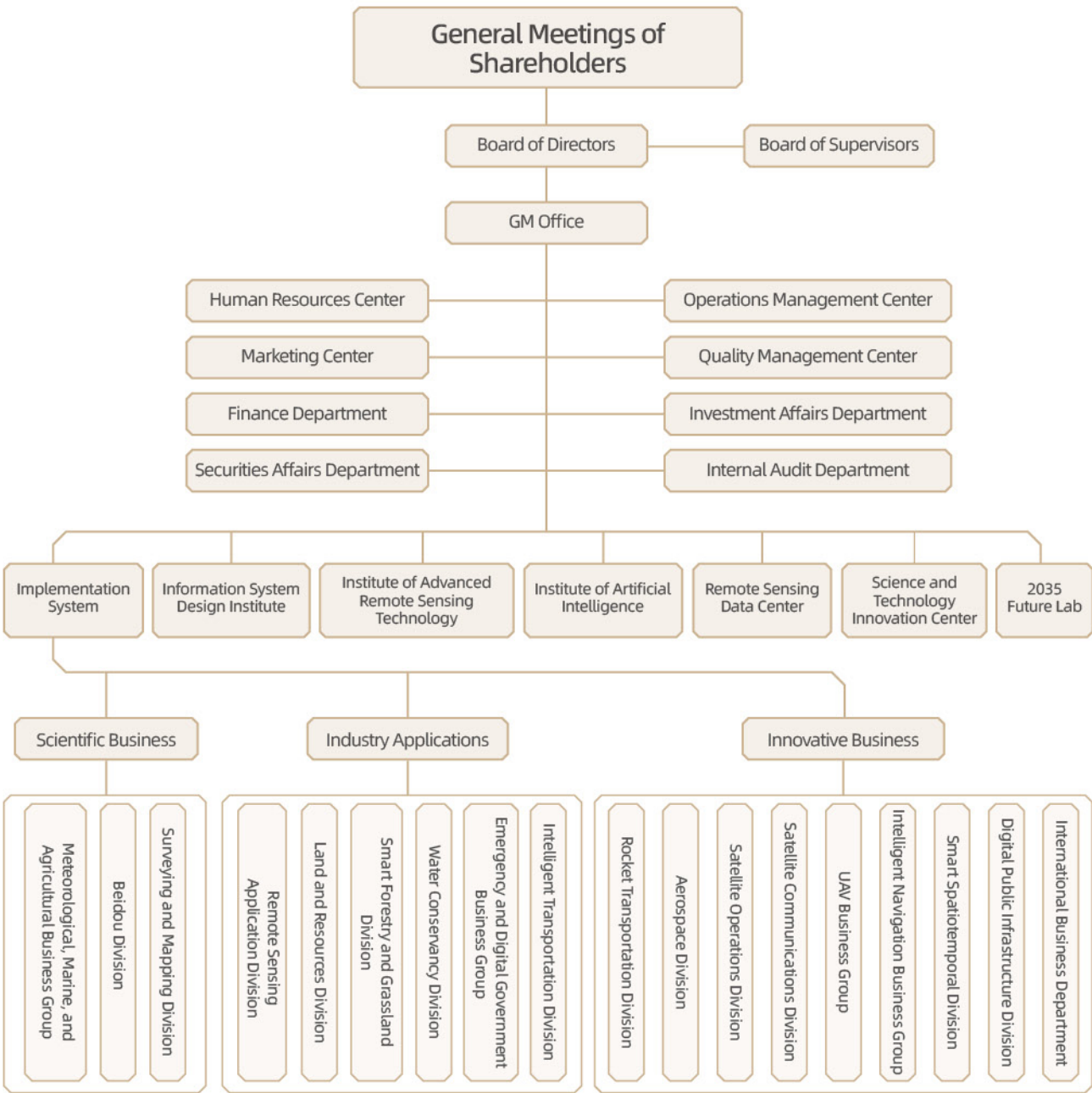
Corporate Culture

Corporate Mission

Serve the Earth and Space Community

Core Values

Serve Customers Wholeheartedly and Work Together Ambitiously

Vision

Multi-Dimensionally Perceive Space and Earth, and Let the Chinese Remote Sensing Software 'PIE' Serve the World

Evolution History

2008
Established on January 24;
Participating in the environmental disaster reduction satellite project

2009
Releasing independently-developed PIE Remote Sensing Software V1.0, which has been currently updated to V6.3

2010
Participating in the major project for high-resolution Earth observation

2012
Participating in the construction of the Fengyun-3 satellite mission

2016
Participating in the airborne land and marine satellite project during the 12th Five-Year Plan period

2017
Participating in the Fengyun-4 satellite mission and the BeiDou-3 satellite project

2018
Participating in the airborne land and marine satellite project during the 13th Five-Year Plan period

2019
On July 22, PIESAT was among the first batch of listed enterprises on the STAR Market;
Our remote sensing software PIE meeting the most advanced international standards

2020
Launching PIE-Engine, the first remote sensing cloud service platform in China

2021
Participating in the top-level design of the airborne land and marine satellite project during the 14th Five-Year Plan period

Constructing the PIESAT-1 synthetic aperture radar (SAR) satellite constellation

2022
Successfully launching the first-batch satellites of the PIESAT-1 radar remote sensing constellation at the initial phase of the "Nuwa Constellation";

2023
Data products listed on the Shanghai Data Exchange

2024
On December 17, 2024, the "Shuili-1" remote sensing satellite was successfully launched, marking the official entry of China's first remote sensing satellite named after water conservancy into space.

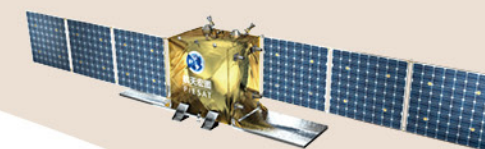# Standardized Governance: Strengthening the Foundation for Stable Development

◎ Enterprise Governance

◎ Compliant Operation

◎ Information Construction

◎ The Foundation of Party Building

◎ Responsibility Management

Enterprise Governance

The Company has further strengthened its enterprise management to better achieve cost reduction and efficiency enhancement. By focusing on its core business, the Company has leveraged its internal synergies, upgraded and optimized its organizational structure, and established the Emergency and Digital Government Business Group, the Meteorological, Marine and Agricultural Business Group, and the Water Conservancy Business Group, and the UAV Business Group. It has refined its innovation system, further harnessed the technological spillover effects, and reinforced the support capabilities of its six major R&D centers in East China, Central China, North China, and other regions, to provide technical services to over 100 branches nationwide. Additionally, the Company has enhanced international cooperation and actively expanded its global footprint by setting up international branches in countries such as Singapore, Malaysia, Thailand, and Pakistan. With a service network spanning across the globe, the "Nuwa Constellation" satellite data services are now serving the world.

The Company constantly improves its corporate governance structure, establishes and perfects its internal control system, standardizes the operation, and effectively protects the legitimate rights and interests of the Company and its shareholders. It timely and accurately disclosed information, strove to maintain good relations with investors, and sought legitimate rights and interests for investors. It also adhered to standardized internal control and improved the effectiveness of the Company's internal control.
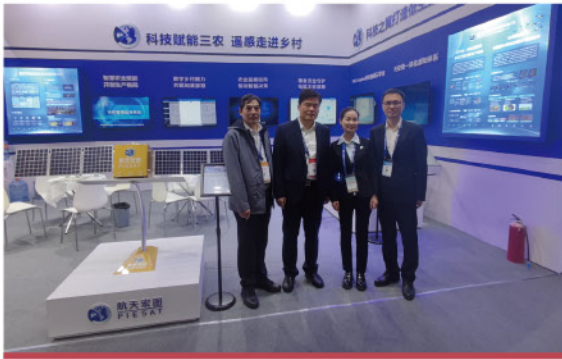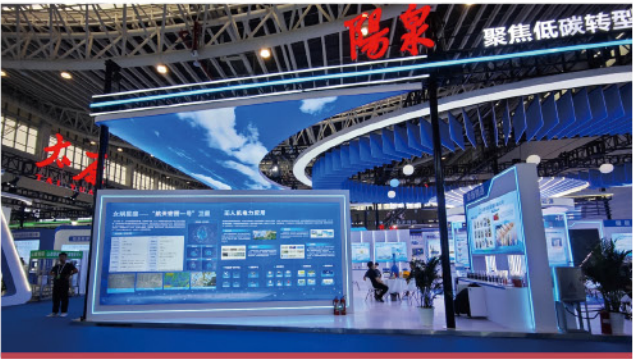
Compliant Operation

The Company proactively and steadily improves its corporate governance structure in strict compliance with the relevant requirements stipulated in a series of laws, regulations, and normative documents, including the *Company Law of the People's Republic of China,* the *Securities Law of the People's Republic of China,* the *Code of Corporate Governance for Listed Companies in China,* and the *Rules Governing the Listing of Stocks on the Science and Technology Innovation Board of Shanghai Stock Exchange.* During this process, the Company invested human, material, and time resources to set up a professional regulatory research team that conducted in-depth analyses of various regulatory provisions, ensuring that every governance decision aligns closely with legal requirements.

Since its listing, the Company has continued to optimize its governance standards, refine its internal systems, enhance the quality of information disclosure, and operate in full compliance with laws and regulations. It has formulated multiple policies covering the work of the board secretary, manage investor relations, information disclosure, public opinion management, and market value management. The Company engages in communication with investors in various forms to actively convey its corporate value.

The Company's Board of Directors consists of nine members with diverse professional expertise, providing robust support for major decision-making. The Board of Supervisors comprises three members, including one employee representative supervisor, effectively overseeing operational decisions and safeguarding the rights and interests of all shareholders.

Information Construction

In today's digital age, information construction has emerged as a critical driver for enterprises to enhance their competitiveness, optimize operational efficiency, and achieve sustainable development. In 2024, the Company made upgrades and improvements in its information construction efforts, actively investing and achieving a series of notable results that provided strong support for the rapid growth of its business and the enhancement of its management standards.

▎ To enhance the security of customer data, the localized deployment of the Customer Relationship Management (CRM) system is nearing completion and is currently in the final phases of development.

▎ Refined management has been implemented for the reimbursement process, with the newly launched budget control feature adopting the PDCA (Plan-Do-Check-Act) model to ensure strict data control.

▎ To prevent the leakage of sensitive data, the IPguard system has been deployed to enhance the ability to identify sensitive information in outgoing files, with all such files subject to a rigorous approval process.
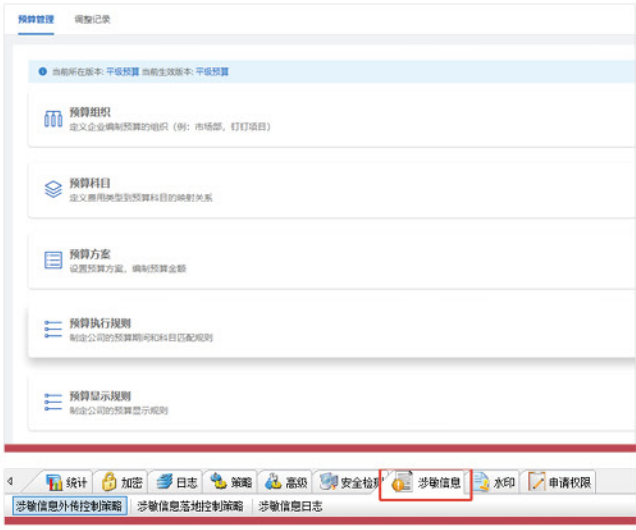
The Foundation of Party Building

The year 2024 marks the 75th anniversary of the founding of the People's Republic of China and a pivotal year for achieving the goals and tasks set forth in the 14th Five-Year Plan. Under the correct leadership of the CPC Beijing Municipal Committee and the Beijing Municipal Government, the CPC Branch of PIESAT actively guides all Party members, officials, and members of the public within the Company. They earnestly implement the guiding principles of the 20th CPC National Congress and the 2nd Plenary Session of the 20th Central Committee. They delve into General Secretary Xi Jinping's important thoughts on party building, organize Party members to engage in political studies, ideological exchanges, and organizational activities to effectively enhance their caliber and abilities in carrying out Party affairs.

01 Strengthening political construction and enhancing ideological guidance

Party members of the CPC Branch of PIESAT actively participate in cloud-based learning activities organized by the organization departments of the CPC municipal and district committees, specialized training courses for cultivating party building brands in emerging fields, and relevant training and publicity events organized by the Beijing Municipal Internet Enterprise Working Committee. These efforts have continuously raised the political awareness and moral standards of Party members and significantly improved the party building standards of the CPC Branch of PIESAT.

## 02 Enhancing themed activities and fulfilling corporate social responsibilities

In 2024, to give full play to its pioneering and exemplary role, the CPC Branch of PIESAT actively participated in various activities such as "Exploring the Journey Through Light and Shadow, Forging Ahead on the New Era's Path" and "Praising the New China, Eulogizing the New Era" organized by the CPC Sijiqing Town Committee. Additionally, it conducted themed party day activities featuring the study of Chinese classical culture, including visits to the Confucian Temple and the Imperial College Museum, to inspire patriotism among Party members. During floods in various regions, Party members took the lead in leveraging the Company's technological advantages to actively engage in disaster relief efforts.

03 Implementing key tasks from higher authorities and deepening the integration of party building and business operations

In response to the call of higher-level party organizations, the CPC Branch of PIESAT actively collaborated with the Beijing Municipal Internet Enterprise Working Committee in assisting Party members who face difficulties in their lives, effectively addressing their practical problems. The CPC Branch of PIESAT continuously explores a deeply integrated model of "party building+business operations" by conducting exchange activities on the integration of party building and business operations with the Second CPC Branch of the Sijiqing Town Government Offices, the Cadre Training College of the Department of Emergency Management, the Space Security Satellite System Engineering Department of Aerospace Dongfanghong, and the Beijing Daily Group, among others. These activities have underscored the significant role of party building in promoting the Company's business development.
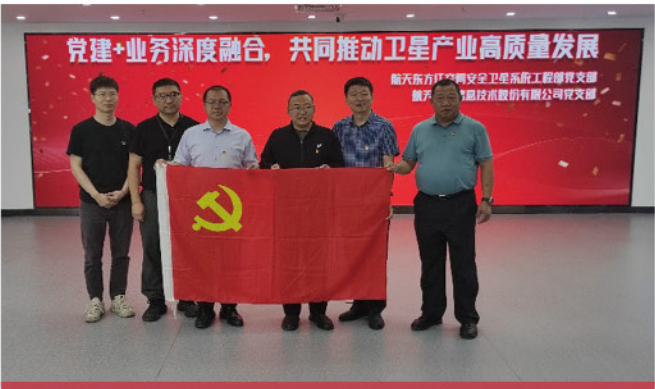


Responsibility Management

The Company attaches great importance to communication with stakeholders, continuously understands the expectations and appeals of all parties, establishes diversified and effective ways of Communication, and actively listens to the opinions and suggestions of all parties.

Stakeholders	Issues	Ways of Communication
Government and regulatory authorities	• Compliant operation • Tax payment according to law • Response to national policies • Obedience to regulatory requirements	• Observe law and discipline • Cooperate with supervision and inspection • Participate in major meetings and activities • Report work regularly
Shareholders and investors	• Steady development of the enterprise • Stable return on investment • Reasonable operation and information disclosure	• Improve corporate governance • Discloses information and announcements regularly • Manage investor relations
Users	• Product function iteration • Service quality improvement • Smooth communication channels	• Constantly improve R&D capabilities and talent quality • Investigate service evaluation system and customer satisfaction • Daily visit and contact with users
Suppliers and partners	• Fairness and integrity • Long-term stability	• Optimize and perfect the supplier management system • Fulfill contracts according to law
Staff	• Protection of basic rights and interests • Reasonable compensation and benefits • Training and development • Health and safety	• Staff conferences • Fair and just promotion channels • Improved employee training • Flat and multi-dimensional communication
Communities and the public	• Participation in public welfare undertakings • Promoting the development of the industry	• Take an active part in public welfare activities • Constantly improve R&D capabilities
Ecological environment	• Energy-saving operation • Environmental protection	• Control carbon emissions • Participate in environmental protection

Steady Progress for Sustainable Success: Upholding Technological Innovation and Achieving New Heights in Innovation

◎ Nuwa Constellation's Dual Showcases of Strength, Robust Networking Ushers in a New Era of Earth Observation

◎ New Products Constantly Emerge to Serve the Building of a Digital China

◎ Listing of Remote Sensing Data Products Ushers in a New Era of Digital Applications
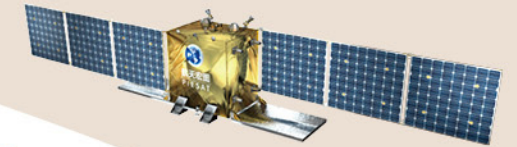
Nuwa Constellation's Dual Showcases of Strength, Robust Networking Ushers in a New Era of Earth Observation

In 2024, PIESAT made significant strides in the construction of the "Nuwa Constellation", with the successful launch of two satellite missions on November 9 and December 17, respectively. These launches have injected a strong impetus into the development of China's commercial radar remote sensing sector. The "Nuwa Constellation" has shone brightly in the commercial aerospace industry, achieving remarkable progress and emerging as a leader among China's commercial radar remote sensing satellite constellations.

The Company's PIESAT-2 constellation is planned to launch 16 radar satellites, including 12 X-band and 4 C-band SAR satellites. The first two groups of satellites (PIESAT-2 01-04 and PIESAT-2 09-12) were successfully launched on November 9 and December 17, 2024, respectively. The constellation adopts a sun-synchronous orbit and a 90-degree equi-phase in-orbit formation, with four satellites sharing the same orbit to form a 2×4 Walker constellation system. This includes China's first specialized water conservancy satellite, Shuili-1. The PIESAT-2 constellation boasts such capabilities as high-resolution imaging with individual satellites, high-precision interferometric measurements with multiple satellites, on-board data processing and autonomous planning, emergency communication and rapid response, as well as continuous and stable data production. It primarily conducts regular global coverage, rapid revisits to specific regions, high-frequency monitoring of key targets, and emergency deployment for special scenarios.

With the 12 satellites of the PIESAT-1 and PIESAT-2 constellations operating in a network, the "Nuwa Constellation" has now become the largest radar remote sensing satellite constellation in China and the second largest globally. Its multi-imaging modes, high-resolution data, and rapid response capabilities precisely serve multiple fields such as natural resources and disaster prevention and mitigation. As of February 2025, the satellites in orbit supported over 100 emergency events, including flood control during the flood season, geological and earthquake disasters, and damage assessments. Notably, during the emergency response to the dike breach in Dongting Lake, the "Nuwa Constellation" conducted four tracking and monitoring missions, demonstrating the best performance among domestic commercial radar remote sensing systems. During the emergency response to the 6.8-magnitude earthquake in Dingri, Tibet, the "Nuwa Constellation" successfully verified its multi-satellite collaborative observation capability, with only a 20-minute interval between two imaging sessions and data delivery completed within one hour after imaging. With the full-scale operational deployment of the networked constellation and the activation of on-board processing and ground mobile reception modes, the advantages of the "Nuwa Constellation" can be significantly leveraged.

Figure 1: Construction Area on the East Bank of the Yalu River (PIESAT-2, 0.5m Sliding Spotlight, Imaged on November 15, 2024)

Figure 2: Construction Area on the West Bank of the Yalu River (PIESAT-2, 0.5m Sliding Spotlight, Imaged on November 15, 2024)

Figure 3: Construction Area on the East Bank of the Yalu River (PIESAT-2, 1m Sliding Spotlight, Imaged on November 15, 2024)

New Products Constantly Emerge to Serve the Building of a Digital China

01 PIE-Engine Tianquan Large Model Remote Sensing Cloud Service: Leading Innovation in AI Remote Sensing Technology
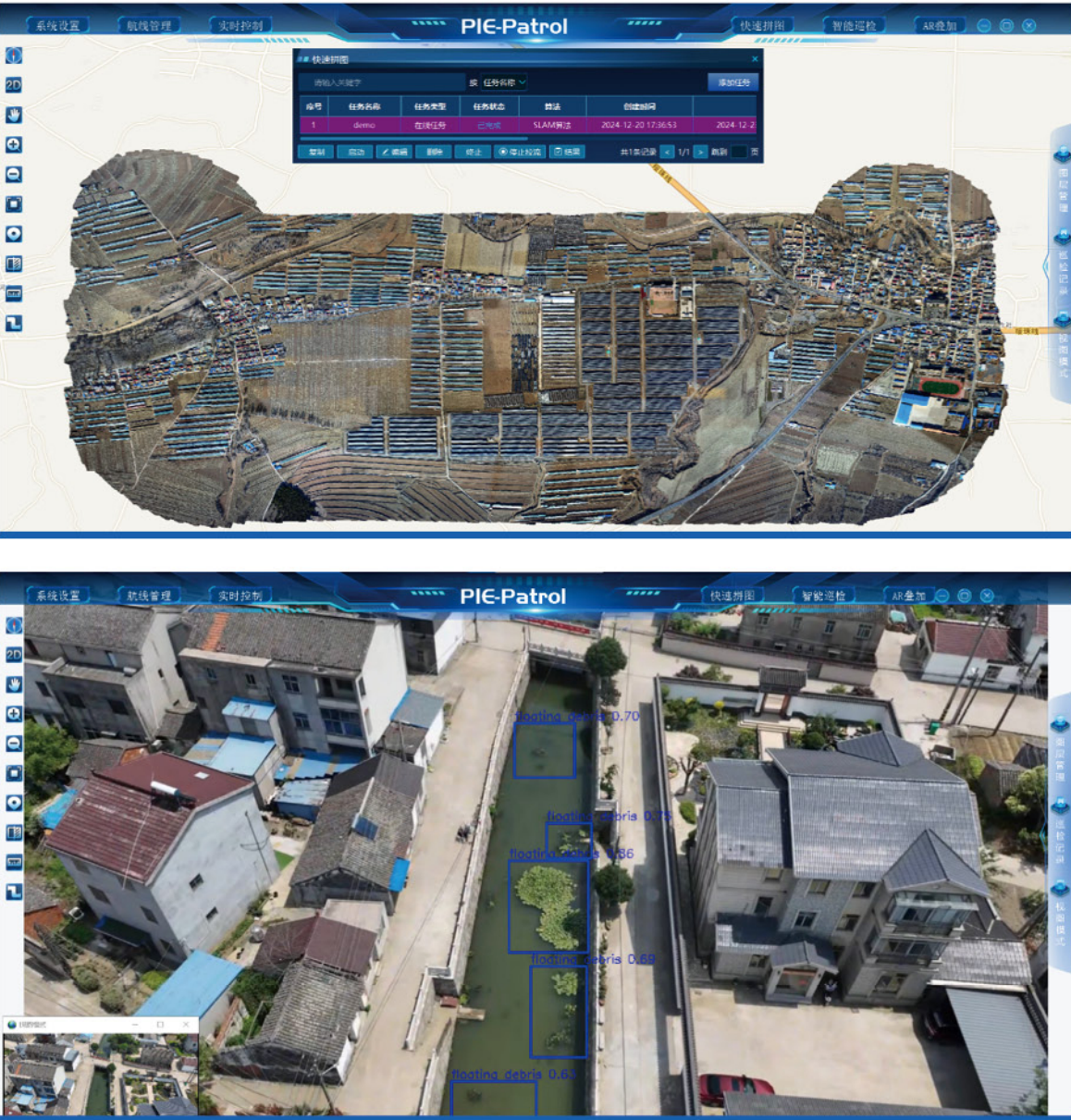
The PIE-Engine Tianquan Large Model Remote Sensing Cloud Service leverages PIESAT's internationally leading multimodal satellite imagery resources, such as the "Nuwa Constellation", along with cutting-edge technologies such as visual large models and artificial intelligence content generation, to offer services for intelligent interpretation, intelligent enhancement, and 3D reconstruction of remote sensing imagery. This product delves deeply into industry applications in the field of remote sensing intelligent interpretation, aiming to tackle the challenges posed by the complexity and diversity of remote sensing data interpretation. Its functions include large models for intelligent interpretation of ground feature elements, target detection in specific scenarios, road extraction, water body extraction, change detection, image super-resolution, defogging, and rapid 3D construction, among others. The product provides users with efficient, accurate, and highly generalized services on an intelligent remote sensing cloud platform, which is widely applied in such fields as natural resources, emergency response and disaster mitigation, ecological and environmental protection, surveying and mapping navigation, digital villages, finance and energy, and smart cities.
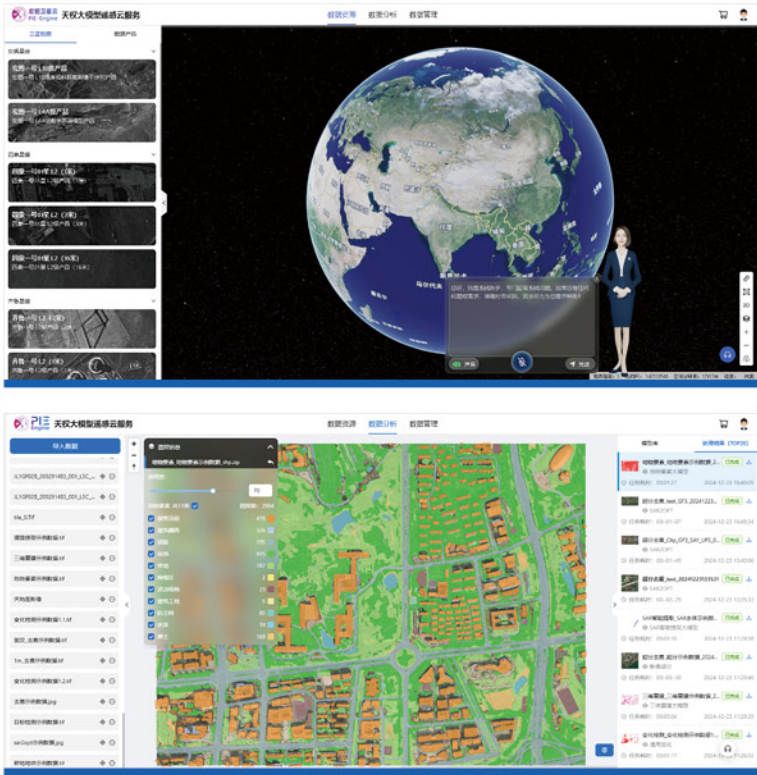
PIE-Engine Tianquan Large Model Remote Sensing Cloud Service Platform (a) Remote Sensing Cloud Data Resources (b) Intelligent Interpretation of Ground Feature Elements by Large Models

02 PIE-Patrol UAV Intelligent Inspection Software: Spearheading New Developments in AI Remote Sensing for the Low-Altitude Economy

The PIE-Patrol UAV Intelligent Inspection Software is an intelligent inspection solution that operates on ground control stations or PCs, providing UAV device connectivity, flight path mission management, as well as real-time mosaicking and inspection capabilities. It can be widely applied in intelligent inspection solutions across multiple fields, including smart cities, intelligent transportation, disaster emergency response, ecological and environmental protection, forestry and agriculture fire prevention, security monitoring, and new energy.

PIE-Patrol UAV Intelligent Inspection Software (a) Real-time Rapid Mosaicking, (b) Real-time Inspection

03 PIE-Engine Tianquan Intelligent Agent: A Pioneer in Intelligent Innovation for Remote Sensing Applications

The PIE-Engine Tianquan Intelligent Agent Platform is a one-stop large model agent development platform that empowers users to rapidly design, build, and deploy agent applications through an intuitive and user-friendly interface. It can be extensively applied in various fields such as digital human assistants, virtual exhibition hall consultations, and information services for meteorology, oceans, agriculture, forestry, and water resources, to fulfill customized customer needs. The platform offers three key advantages: one-stop development, professional customization, and flexible deployment. The PIE-Engine Tianquan Intelligent Agent Platform has fully integrated the DeepSeek large model, which further enhances the platform's multimodal processing capabilities and intelligence level.
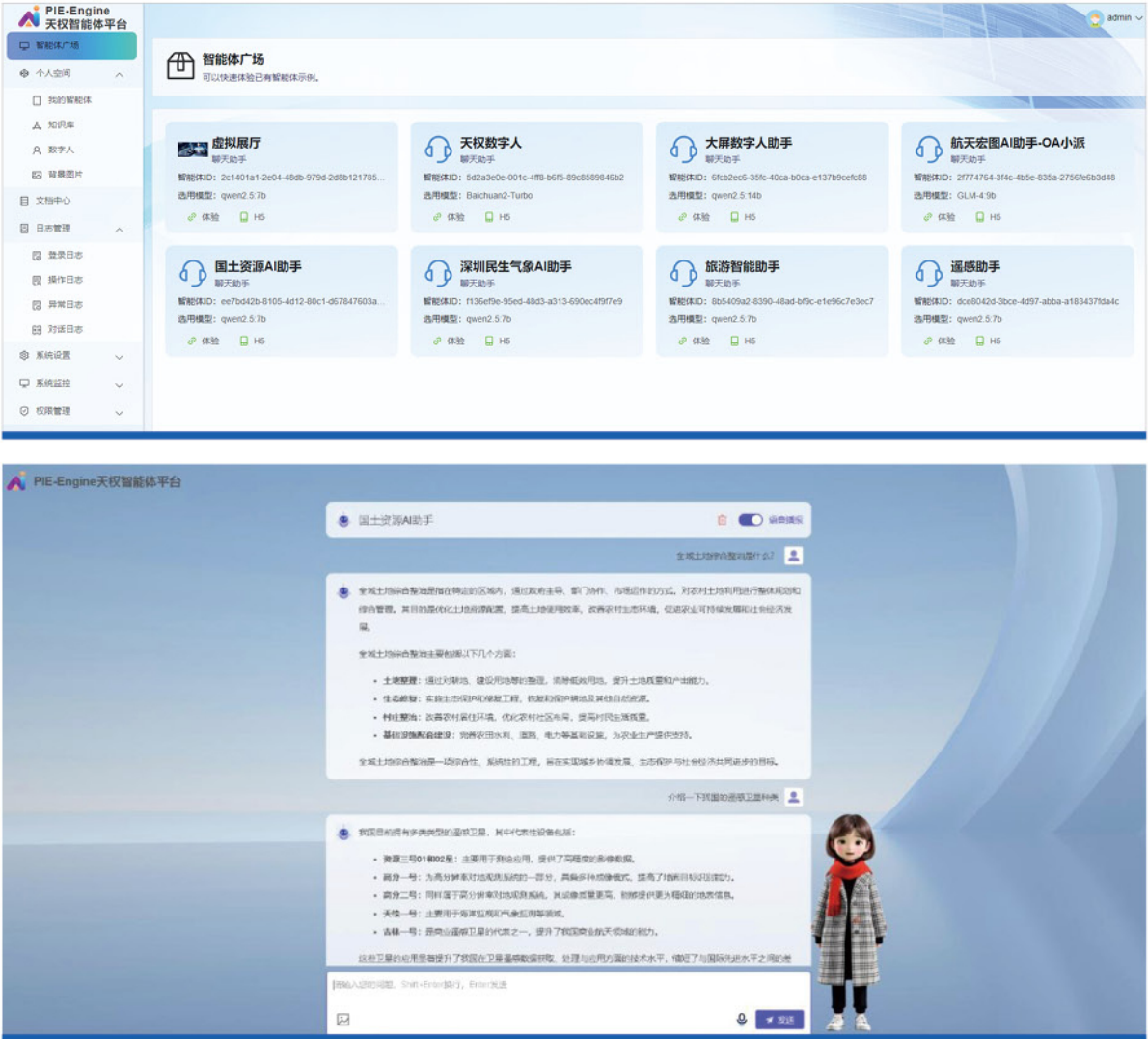

PIE-Engine Tianquan Intelligent Agent Platform (a) Backend System Settings (b) Frontend Display

04 Precision in Meteorological Services Pioneered by PIESAT

PIESAT holds a leading position in the meteorological industry, leveraging its technological strengths and extensive experience in satellite remote sensing applications, meteorological big data management, and other fields to offer comprehensive solutions for meteorological operations. The Company fully harnesses the pivotal role of meteorological and remote sensing monitoring in ensuring food security and unlocks its immense potential. Based on multi-source data such as satellite monitoring data and ground meteorological observations, it has tailored agriculture meteorological disaster warning systems for numerous clients, including Shijiazhuang City, Hebi City, and Shandong Province.
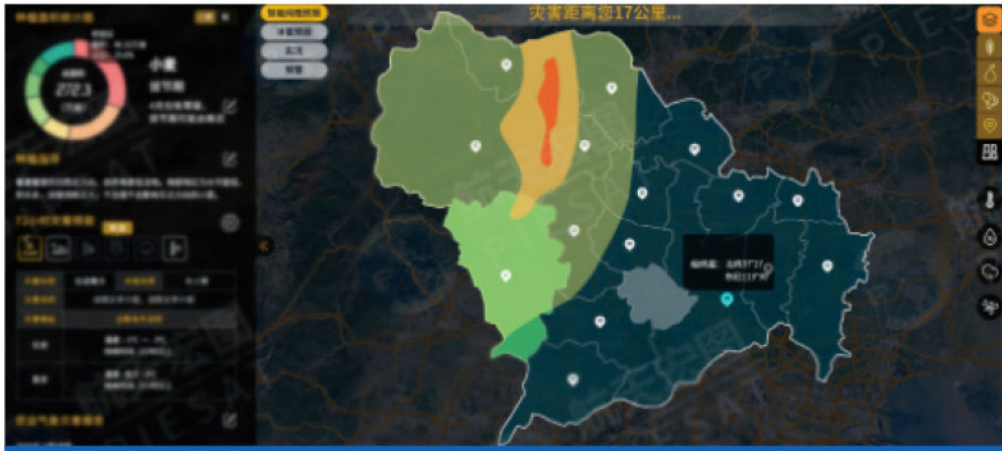
Agriculture Meteorological Disaster Assessment System

05 Technology Empowers Emergency Flood Control and Disaster Mitigation

In 2024, PIESAT established a comprehensive business system for emergency response, with key operations encompassing disaster remote sensing monitoring, integrated monitoring and early warning of natural disasters, emergency command and dispatch, investigation, assessment, and specialized planning of emergency shelters, updating and application of disaster risk survey data, urban lifeline risk assessment, and regulatory engineering projects, among others. The Company's self-developed PIE technology underpins multiple core products, such as the emergency data middle platform and resource-sharing portal, natural disaster risk survey data collection system, natural disaster model algorithms, integrated monitoring and early warning system for natural disasters, emergency cloud and command-specific systems, etc., forming a full-process solution that covers "risk management - monitoring and early warning - emergency command - post-disaster assessment." The Company provided real-time satellite monitoring support for major events, including the breach of the Dongting Lake dike in Yueyang, Hunan Province, heavy rainfall in the Beijing-Tianjin-Hebei region, extremely heavy rainfall in Huludao, Liaoning Province, and the earthquake in Jishishan, Gansu Province. The Company implemented a series of national-level business systems, including the National Emergency Command System of the Ministry of Emergency Management, the "Tianyan" Satellite Monitoring System 2.0, the Earthquake Disaster Chain Scenario Deduction System, and the National Emergency Shelter Auxiliary Dispatch System.

06 Exploration of a New Marine Data Sharing Economy Model

In 2024, PIESAT actively explored a marine data sharing economy model. Regarding the sharing of marine monitoring data, the Company collaborated with marine research institutions and marine management authorities to establish a mechanism for sharing marine monitoring data, enabling the sharing and circulation of such data and promoting synergies between innovation in marine scientific research and marine management. The marine data sharing economy model has played a role in breaking down barriers to marine resources and data, enhancing the efficiency of marine resource utilization, and driving innovation and development in the marine industry.

07 Satellite Internet+Remote Sensing Technology: Empowering Agricultural and Rural Modernization

In 2024, PIESAT continued to enhance its industry-specific products and technical service capabilities, integrating multi-source data from space, air, ground, and human sources to build the core engine of an agricultural big data model. Driven by artificial intelligence, the Company facilitates intelligent decision-making in various sectors including agriculture, cultural tourism, special industries, rural emergency response, and information services for public benefit, thus contributing to rural revitalization. The Company deeply engaged in major initiatives such as the comprehensive rural reform and the "Five Goods and Two Suitabilities" project, exploring pathways and methodologies for rural revitalization tailored to different regions. It developed "unmanned farms" capable of autonomous decision-making and operations, and established a "Digital Rural Cloud Brain" that enables comprehensive perception of township-level information through a unified network and centralized smart decision-making via a single screen. The Company supported the "Jiangsu Province High-Standard Farmland Survey, Mapping, and Database Entry Project", which is a significant exploration and practice in the digital management of high-standard farmland nationwide. It also participated in "Green Pakistan," the national smart agriculture project in Pakistan, empowering farm production management and providing agricultural modernization pilots for Pakistan.

Unmanned Farm Digital Platform

Digital Rural Cloud Brain Platform

Provincial-level High-Standard Farmland Database Management System

Pakistan Smart Farm Management Platform

08 Development and Innovative Applications of the "Air-Space-Ground Water Engineering" System in the Water Conservancy Sector

In 2024, PIESAT continuously contributed to the "Air-Space-Ground Water Engineering" integrated monitoring system in water conservancy through the deployment and application of the "Nuwa Constellation", self-developed the UAV, hydrological and hydraulic monitoring equipment, etc. By actively promoting the business applications of the PIE series products and the multimodal "Tianquan" large model in water conservancy, the Company tailored a water conservancy remote sensing SAAS service platform to facilitate the automated production of water conservancy remote sensing products for water bodies and the "four types of disorders" in rivers and lakes. This platform enables on-demand production, data services, and application development, and has created a water conservancy digital twin platform with distinctive PIESAT features. The Company continued to delve deeper and seek technological innovations in its core businesses such as flood and drought disaster prevention and water resources management, as well as its expanded businesses like urban and rural drainage, water rights trading, and smart rivers and lakes. It developed multiple typical business scenario applications featuring "Artificial Intelligence+Water Conservancy."

As of the end of 2024, the "Nuwa Constellation" deployed 12 in-orbit radar satellites (X-SAR), capable of all-weather, day-and-night high-resolution imaging, with a revisit period as short as six hours, significantly enhancing the timeliness and accuracy of water conservancy monitoring. The "Nuwa Constellation" is scheduled to complete the networking of 20 satellites by 2025 and achieve global "daily coverage and hourly revisit," which will further enhance the high-frequency and continuous monitoring capabilities for flood disasters and engineering safety. Satellite data primarily serves water conservancy emergency events, with which the Company efficiently responded to and supported over 100 disasters nationwide.

Listing of Remote Sensing Data Products Ushers in a New Era of Digital Applications

With the development of the global satellite internet, the applications of remote sensing data have become increasingly extensive, expanding from traditional farmland measurement to various fields such as finance and insurance, emergency management, and natural resource management. Remote sensing data is emerging as a core data source for the digital economy. In August 2023, PIESAT, as a leading satellite internet enterprise in China, completed the listing of six major series, totaling 14 categories of data products, on the Shanghai Data Exchange. By deeply integrating high-resolution satellite data with multi-source heterogeneous data, PIESAT introduced standardized and customizable remote sensing data products. Leveraging the deep integration of various technologies such as artificial intelligence, cloud computing, and blockchain, the Company addressed the pain points of traditional remote sensing data, characterized by fragmentation and high application thresholds. This enables rapid access to products such as high-precision ground surface monitoring and dynamic environmental modeling, providing "ready-to-use" digital solutions for such sectors as agriculture, environmental protection, emergency management, and urban planning. With these solutions, the Company achieved a leapfrog development from "raw data" to "scenario-based services," and offered customers stable and reliable data product support and continuous remote sensing data analysis services, thus assisting them in realizing digital and intelligent remote sensing application services.

The digital economy, with data elements as its key production factor, is of great significance for the high-quality development of Chinese modernization. PIESAT continues to seize the development opportunities in the era of data elements, pioneering new paths for big data innovative applications and value realization through more in-depth innovations. The Company strives to become a leading "data merchant" in China, leveraging its strong data
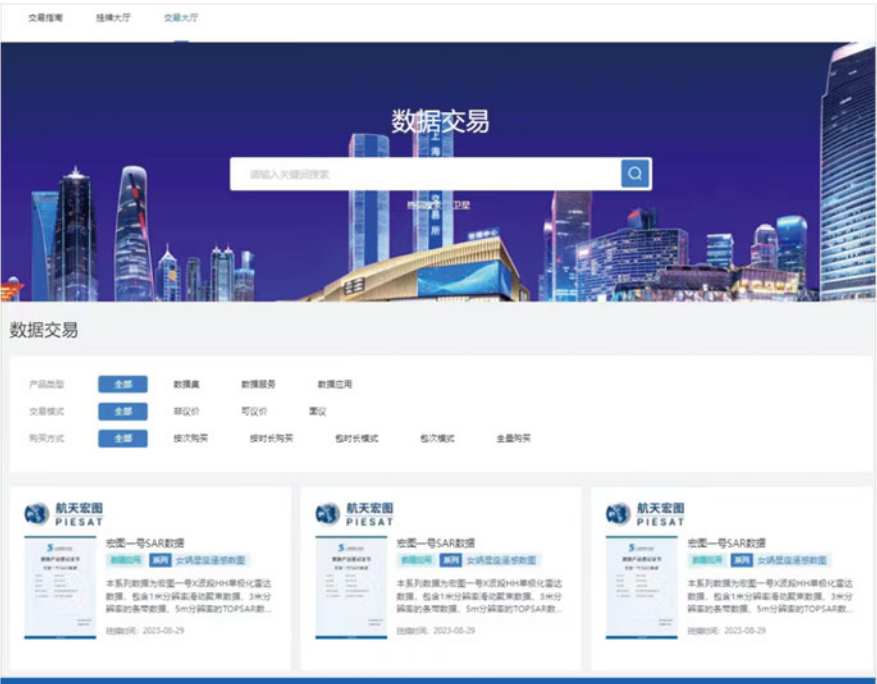

"refinement" capabilities to play a proactive role in the trinity construction of digital government, digital economy, and digital society. It provides precise, real-time, and comprehensive "digital earth" perception capabilities for various industries and, with data elements as the link, accelerates the deep integration of digital technology and the real economy, injecting new momentum into the high-quality development of the economy and society.

Green and Low-Carbon: Practicing Smart Environmental Protection to Boost Growth

◎ Integrated Air-Space-Ground Regulatory Framework for Natural Resources: Enabling Precision in Ecological Protection and Restoration

◎ It Remains Committed to Energy-saving and Low-Carbon Practices and Embraces Green Development
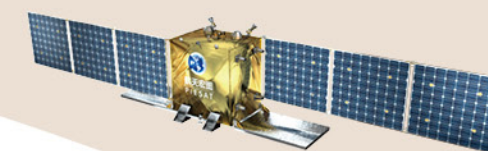
Integrated Air-Space-Ground Regulatory Framework for Natural Resources: Enabling Precision in Ecological Protection and Restoration

Enhancing the integrated conservation and systematic governance of natural resources such as mountains, waters, forests, fields, lakes, grasslands, and deserts is a pivotal initiative to thoroughly implement Xi Jinping's thought on ecological civilization and serves as an essential guarantee for building a Beautiful China. Since the 18th CPC National Congress, China has placed great emphasis on ecological civilization, incorporating it as a key element of the Five-sphere Integrated Plan and the Four-pronged Comprehensive Strategy of socialism with Chinese characteristics. The 20th CPC National Congress and the Third Plenary Session of the 20th CPC Central Committee also underscored that Chinese modernization features harmonious coexistence between humanity and nature. Development must be planned from the standpoint of achieving this harmony.

PIESAT closely aligns with the key objective of ecological restoration, deeply integrating new quality productive forces represented by satellite remote sensing, the Internet of Things (IoT), big data, cloud computing, and artificial intelligence with the integrated protection and restoration projects for mountains, rivers, forests, farmlands, lakes, grasslands, and deserts. The Company has established a monitoring and evaluation indicator system for landscaping projects, an integrated "Air-Space-Ground" perception system, a project database and management platform, as well as a big data analysis and visualization platform for project effectiveness. By these means, PIESAT drives transformations in project management and effectiveness monitoring methodologies for landscaping projects. These efforts have driven the digitalization, intelligence, and systematization of landscaping projects, providing technical support for the high-quality implementation of landscaping projects and for building a Beautiful China.

01 Development of a Monitoring and Evaluation Indicator System

Monitoring and evaluation indicators are set at different scales for projects, restoration units and sub-projects, based on the performance evaluation objectives of projects and regional ecological characteristics. The setting of these indicators follows industry guidelines and standards, including the *Specifications for Effectiveness Evaluation of Territorial Ecological Conservation and Restoration Projects,* the *Specifications for Acceptance of Territorial Ecological Conservation and Restoration Projects,* and the *Guidelines for Ecological Protection and Restoration Projects of Mountains, Rivers, Forests, Farmlands, Lakes, and Grasslands (Trial Implementation).*

02 Integrated Air-Space-Ground Sensing System

PIESAT leverages various technologies such as remote sensing satellites, unmanned aerial vehicles (UAV), and Internet of Things (IoT) to build an integrated "Air-Space-Ground" sensing and monitoring network. The network serves to conduct comprehensive and three-dimensional dynamic monitoring of ecological information related to mountains, rivers, forests, farmlands, lakes, grasslands, and deserts. This enables full-cycle, closed-loop monitoring of ecological information throughout the entire process of integrated protection and restoration projects for mountains, rivers, forests, farmlands, lakes, grasslands, and deserts.

03 Project Database and Management Platform

PIESAT has established a project database and management platform to achieve closed-loop management throughout the entire lifecycle of integrated protection and restoration projects for mountains, rivers, forests, farmlands, lakes, grasslands, and deserts. The platform serves to improve the project management workflow and provide support for the timely acquisition of information on project progress, quality, and funding, thus ensuring the reasonable and standardized implementation of projects.

04 Big Data Analysis System for Effectiveness Assessment

Based on data of monitoring and evaluation indicators, PIESAT leverages big data technology to analyze the effectiveness of ecological restoration and provide early warnings for ecological issues. Relying on AI and large model technologies, restoration plans are optimized to support the effectiveness assessment, performance evaluation, adaptive management, and intelligent decision-making of integrated protection and restoration projects for mountains, rivers, forests, farmlands, lakes, grasslands, and deserts.

05 Integrated Visualization Platform for Mountains, Rivers, Forests, Farmlands, Lakes, Grasslands, and Deserts

An integrated visualization platform is developed in the form of an overview map of ecological protection and restoration projects and a leadership dashboard. This platform offers a visual representation that integrates project implementation processes, restoration and governance outcomes, dynamic monitoring data, ecological benefit analysis results, project performance evaluations, and project information archives.

06 Featured Applications for Regional Ecological Protection

Based on regional ecological characteristics and protection goals, information application systems are established for ecological protection and restoration, including biodiversity management, grazing and cultivation prohibition management, intelligent fire prevention services, and pest monitoring. Through the integrated "Air-Space-Ground" monitoring network and AI empowerment, a transformation is achieved in ecological protection from passive response to proactive prevention and from empirical judgment to data-driven decision-making.

It Remains Committed to Energy-saving and Low-Carbon Practices and Embraces Green Development

In today's world, where global environmental issues are becoming increasingly severe, the mantra "It Remains Committed to Energy-saving and Low-Carbon Practices and Embraces Green Development" is no longer just a slogan but an inevitable choice for enterprises and society at large to achieve sustainable development. For PIESAT, this commitment represents not only a fulfillment of social responsibility but also an intrinsic requirement for our long-term growth and success.

PIESAT has organized a number of training sessions on energy conservation and low-carbon practices, inviting industry experts to explain the concepts of green development, energy management knowledge, and the latest environmental protection policies and regulations in a clear and accessible manner. We have formulated and implemented the *Green Office Behavior Guidelines,* encouraging employees to cultivate energy-saving habits such as turning off lights, computers, and faucets when they are not in use. We also guide employees in proper waste classification and disposal, thereby enhancing resource recycling and utilization rates. The Company will continue to steadfastly pursue the path of energy conservation, low-carbon emissions, and green development. We will actively participate in social environmental protection public welfare activities, serving as a corporate exemplar to inspire and lead more enterprises and social forces to join the green development initiative.

Surging Forward with Vigor: Each Tier of Talent Displaying Excellence

◎ Professional Services Catering to Customer Needs

◎ Professional Solidification of Business Foundation

◎ Professional Support for Operational Assurance

Professional Services Catering to Customer Needs

The Company's marketing service system extends across various regions nationwide, aiming to build a dedicated marketing team that wholeheartedly serves customers. The Company organizes periodic marketing system training sessions based on business needs and industry dynamics. In addition to on-site training, the Company relies on its corporate university and invites internal experts every week at a fixed time to provide training for the marketing team on aspects such as business knowledge, business etiquette, communication skills, and service awareness.


Professional Solidification of Business Foundation

Technology is the cornerstone for technology-based enterprises. In the current rapidly evolving and competitive environment, continuous enhancement of technical capabilities is essential to address the ever-changing market demands. In addition to regular specialized training for various business sectors, the Company consistently encourages employees to "go out" and participate in various professional academic forums and sharing sessions. This approach allows them to absorb knowledge from various sources, enhancing their own capabilities.

Professional Support for Operational Assurance

The Company organizes activities to enhance the capabilities of functional departments, aiming to promote their understanding of the business, strengthen service orientation, and contribute to operational excellence in collaboration with business departments. These activities include sessions where functional departments share business insights and participate in video skills improvement. The Company is driving the development of a functional team that possesses a deep understanding of the business, operates with high efficiency, provides strong service, and is capable of empowering others, which aims to support the Company's overall operational management.
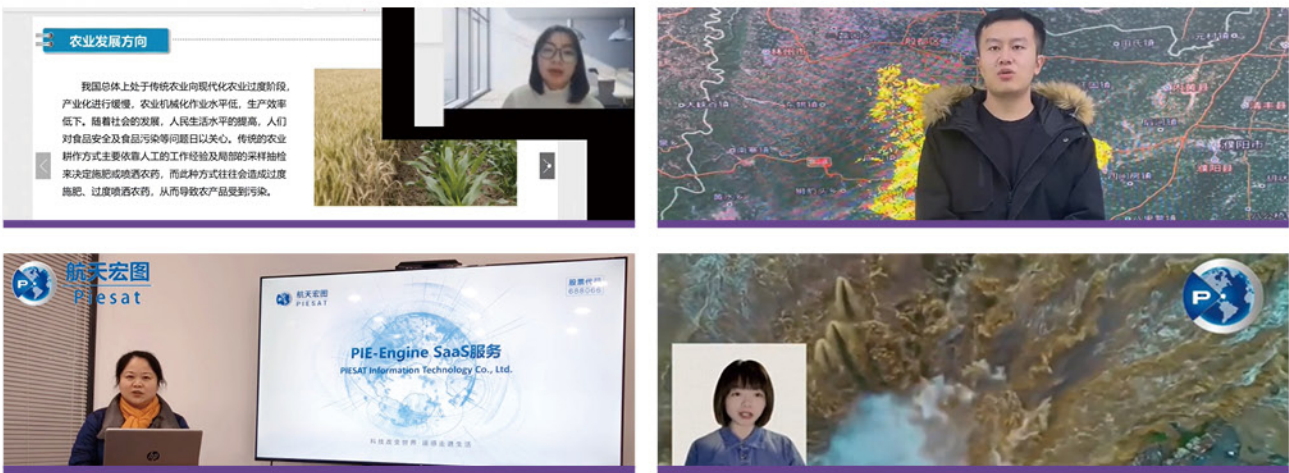
01 Data Navigation: Building a Solid Foundation

Serving as the core engine, the remote sensing data center aggregates vast amounts of multi-source, multi-temporal, and multi-resolution remote sensing data. From the real-time reception of satellite downlink data to the precise calibration of data collected by ground stations, and further to the standardized sorting of historical data, the staff at the data center possess professional skills and maintain a rigorous work attitude to ensure data accuracy. Meanwhile, leveraging the expertise and collaboration of a top-tier technical team, the data center continues to push the boundaries of data collection, processing, and analysis. From the intelligent interpretation of massive satellite imagery to the precise modeling of multi-source data fusion, they transform complex data into practical solutions. They break through challenges with innovative thinking and tackle difficulties with professional capabilities, providing the industry with highly timely and accurate remote sensing data services, making data truly become the "living water source" that drives development.

02 Innovation-Driven and Diversified Expansion

Faced with the diversified demands for data services in the market, we leverage our "each tier of talent" to drive a leapfrog upgrade in our service capabilities. Technically, our technicians and experts gain deep insights into the market by integrating remote sensing data with AI and IoT technologies. By developing sophisticated algorithm models and data analysis tools, we offer customized solutions to clients across various industries. Whether it is monitoring crop growth and predicting yields in precision agriculture, analyzing land use changes and optimizing traffic flow in urban planning, or monitoring water quality and tracing pollution sources in environmental protection, we provide precise data support to help users make informed decisions. On the market side, our sales team precisely matches customer needs, builds a customized service system, and actively establishes extensive partnerships with government departments, enterprises, research institutions, and other organizations. We continuously explore new application areas and market spaces, gaining a deep understanding of our customers' business challenges and requirements. From technology to services, each tier of talent breaks down industry barriers with innovative thinking, enabling remote sensing data to empower a wide array of industries.

03 Tackling Technological Challenges to Lead the Future

In the challenging areas of technological R&D, we navigate through innovation bottlenecks with the courage to "surging forward with vigor." Our R&D team comprises seasoned scientists with extensive background in remote sensing, and young engineer teams who pioneer new frontiers in AI, digital twins, and other cutting-edge areas. They delve into the advanced technologies in multidisciplinary fields such as image processing, pattern recognition, and machine learning, striving to enhance the precision and efficiency of data processing. Through repeated experimentation and improvement of vast amounts of remote sensing data, they have successfully developed a series of efficient algorithms with independent intellectual property rights. For instance, the deep learning-based remote

sensing image classification and target recognition algorithm can accurately identify specific ground object types and target objects within complex backgrounds, providing robust technical support for intelligent remote sensing interpretation. Additionally, they transform these advanced algorithms into practical software products, creating the user-friendly and powerful PIE Remote Sensing and Geographic Information Integration Software. This software suite encompasses a toolset, PIE-Engine, PIE-Earth multi-source heterogeneous visualization and analysis, PIE-Engine "Tianquan" large model remote sensing cloud services, and PIE-Engine "Tianquan" intelligent agent, among other platforms. They stimulate innovation through the "inviting public bids for leadership" mechanism and break down departmental barriers through "project-based" collaboration, deeply integrating theoretical research with engineering practice. During the R&D process, team members fully leverage their respective professional strengths, collaborate closely, and overcome one technical challenge after another, injecting innovation vitality into the Company's development.

## 04 Collaborative Empowerment for Enhanced Efficiency

The optimization and upgrading of business lines represent a fusion of talent wisdom and strategic vision. Guided by "customer orientation" and driven by an "efficiency revolution," we refine business processes and service models through multi-dimensional empowerment of each tier of talent. Senior business experts map out key pathways from a holistic perspective, focusing on high-value areas; technical teams reconstruct service scenarios with a user-centric approach, transforming complex technologies into user-friendly products; and sales teams bridge the "last mile" of service with agile responses and innovative marketing strategies. Amidst the "surging currents," every member becomes a "wave-breaker" within the business line, driving a spiral of efficiency and value with their expertise and passion, ensuring that business development flows seamlessly and steady progress for sustainable success.

# Collaborative Dedication: Deepening Services Across the Entire Industry Chain

◎ Securing the Upstream to Achieve Data Autonomy

◎ Strengthening the Midstream for Platform Compatibility

◎ Seizing Downstream Opportunities for Application Scalability

◎ Collaborating in Unity to Build a Smart Ecosystem Together
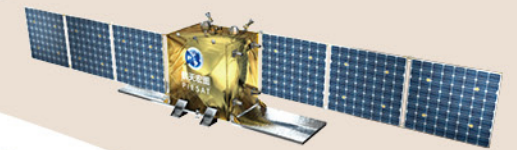
Securing the Upstream to Achieve Data Autonomy

The "Nuwa Constellation" project is a major initiative undertaken by PIESAT in response to China's strategic demands for new quality productive forces. It represents China's largest multi-level, multimodal hybrid remote sensing satellite constellation. Leveraging the new business forms emerging from the development of satellite internet, the constellation system will establish three major technological systems: all-weather Earth observation, intelligent data processing, and "Air-Space-Ground" integration. This will enable comprehensive perception coverage across all regions, elements, and processes, meeting the high-resolution, high-timeliness, high-precision, high-intelligence, and high-reliability perception needs in multiple fields. Through inter-satellite laser communication networking and real-time satellite-to-ground transmission technologies, the constellation system will systematically address industry pain points such as "poor data acquisition timeliness, long information processing chains, low energy efficiency in operation control processes, and restricted business applications." It will enable the full-chain transformation from raw data to incremental value and comprehensively enhance China's core competitiveness in the global remote sensing field.

The first four SAR satellites (PIESAT 1) of the "Nuwa Constellation" were successfully launched on March 30, 2023, and have been put into operation, with normal operating status currently. On November 9 and December 17, 2024, a total of eight SAR satellites from two groups of PIESAT 2 were successfully launched, including China's first water conservancy-specific satellite, Shuili-1. The first images from these satellites have been released, and on-orbit debugging work is underway. They are expected to be fully operational in the second quarter of 2025. In the future, the constellation networking will initiate collaborative observations, fully leveraging the unique strengths of the "Nuwa Constellation" and enabling data to empower more sectors.
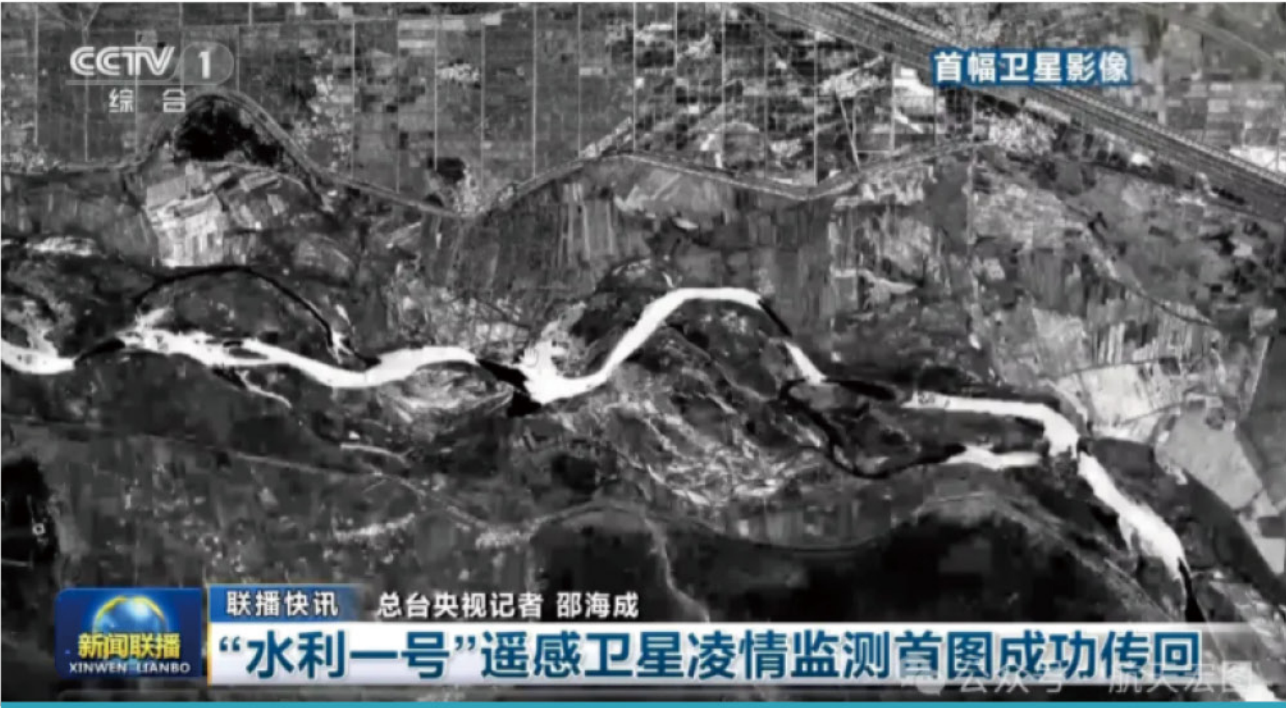
The first ice situation monitoring image transmitted back from "Shuili-1"

Strengthening the Midstream for Platform Compatibility

Certificates for certain innovative products in surveying, mapping, and geographic information from PIE

PIESAT released multiple products in 2024, further solidifying its technological leadership in the industry. The PIE-Engine successively passed the National Information Security Level Protection Certification (Level 3) and CNAS (China National Accreditation Service for Conformity Assessment) certification. The Company also launched the "Tianquan" large vision-language model for remote sensing, which provides large-scale remote sensing models for various application scenarios under the concept of "Model as a Service". The "Tianquan" intelligent agent platform is equipped with multiple large language models fine-tuned with industry knowledge, allowing users to quickly build AI agents tailored to geographical space-time and application industries. The spatio-temporal data service platform can be used to construct distributed spatial data grids, with over 1,000 scenes of free sample data from the "Nuwa Constellation" available, achieving downloads exceeding 25TB within three months. The Company has also signed cooperation agreements with multiple small and medium-sized satellite companies, achieving data resource interoperability. In 2024, four PIE software products from PIESAT were recognized as "Innovative Products in Surveying, Mapping, and Geographic Information," making it the enterprise with the largest number of recognized products among the evaluated organizations.

PIESAT, leveraging the distinctive features of its independently-developed PIE series products, initiated the process of preliminary and in-depth compatibility and adaptation with domestic infrastructure as early as 2019. It has actively contributed to the construction and support of a domestic ecosystem, accomplishing compatibility with various domestic information technology environments, including CPUs, databases, operating systems, and middleware. From 2023 to 2024, the Company's PIE/PIE-Engine series of products fully supported X86, ARM64, and LoongArch architectures. They successively completed compatibility with operating systems/server manufacturers such as Huawei Kunpeng, Galaxy Kylin, CS2C Kylin, Loongson, Phytium, UnionTech, Xfusion, Sugon, Kylinsec, iSOFT, Inspur Software, and Hygon, and fully supported databases/middlewares from manufacturers such as Dameng, Kingbase, Alibaba, HighGo, Vastbase, Uxsino, and Tongtech.

PIE operating system and compatibility with software/hardware manufacturers

Seizing Downstream Opportunities for Application Scalability

In 2024, the "Nuwa Constellation" added eight new satellites to its fleet, made thousands of radar satellite images available for free use, developed and launched the PIE-Engine "Tianquan" Intelligent Agent Platform, and continuously upgraded its on-board intelligent processing technologies. PIESAT has been striving diligently and forging ahead to achieve closed-loop expansion from data increment and technological innovation to application scenarios. The Company's customer service capabilities in various fields, including water conservancy and environmental protection, emergency response and disaster mitigation, natural resources, agriculture and rural areas, meteorology and oceans, as well as smart forestry and grasslands, have been constantly enhanced. The Company shoulders its formidable mission with a sense of responsibility, safeguards everyday life with advanced technologies, and achieves its annual business performance with concrete actions.

The Company successfully launched eight X-band radar satellites of the PIESAT-2 series, and the "Shuili-1" satellite was smoothly sent into orbit. As of now, PIESAT has a total of 12 satellites in orbit, significantly enhancing the "space-based" monitoring capabilities of the digital twin "Air-Space-Ground Water Engineering" integrated monitoring and perception system. To push forward the construction of the "three lines of defense" for rainfall and water situation monitoring and forecasting, the Company conducted research on UAV-based hydrological emergency monitoring technologies.

Collaborating in Unity to Build a Smart Ecosystem Together

As a leading satellite internet enterprise in China, PIESAT leverages its profound technological expertise and advantageous resources, including its self-developed products, technological capabilities, and brand influence. Upholding the concept of collaborative cooperation with relevant parties, the Company integrates diverse resources and pools collective wisdom to jointly build a smart ecosystem, thus achieving maximum mutual benefits and win-win outcomes in both width and depth. Together, we draw the beautiful blueprint of a smart ecosystem and embark on a journey towards the future of interconnectivity.

In 2024, the Company reached strategic cooperation agreements with SiNan Navigation, the Information Center of the Ministry of Water Resources, Yunyao Aerospace, Tianyi Research Institute, Shandong Institute of Industrial Technology for Satellites, Sixiang Technology, Zhixing Space, as well as Beijing Union University, among others.

Staying True to Our Original Aspiration:
## Practicing Public Welfare and Manifesting Corporate Responsibility Through Diligent Actions

◎ Smart Earth Lecture Hall

◎ Taking an Integrated Approach to Industry, Research, and Education

◎ Smell the Flood and Move, Do Flood Control and Disaster Reduction Strong Backing

◎ Providing Support to the Beijing Hydrological Station for the On-site Promotion Meeting on the Construction of the Ministry of Water Resources' Modern Rainfall and Water Situation Monitoring and Forecasting System

◎ Science Popularization Enlightens Minds and Intelligence Shapes the Future
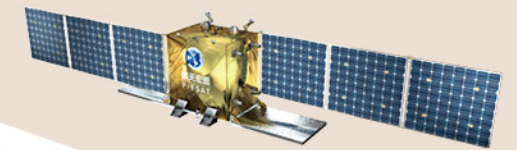
Smart Earth Lecture Hall

PIESAT remains committed to its original mission of practicing public welfare and actively exploring innovative models. The Company has consistently hosted the "Smart Earth Lecture Hall" and successfully organized 60 public welfare lectures in 2024. The lectures featured experts from various fields, including artificial intelligence, smart cities, and commercial aerospace. Over the past four consecutive years, the Company has hosted over 380 lectures, with more than 380 academicians and industry experts sharing cutting-edge technologies and profound insights. These events effectively enhanced industry exchanges and expanded the breadth and depth of earth science popularization.

In 2024, the "Smart Earth Lecture Hall" explored innovative models by transitioning from online to offline events and extending its reach to local regions. The "Starry Dialogue" special tour lectures were conducted nationwide, focusing on current hot technologies and events while integrating the features of local industries. These events brought together industry experts for in-depth analysis and discussion on regional integrated development. The "Smart Earth Lecture Hall" organized the "Starry Dialogue" salon events nationwide in places like Jiangxi Province and Hangzhou, which facilitated in-depth exchanges and interactions with experts and industry practitioners offline. These events further strengthened regional industry exchanges and the promotion and application of earth observation-related technologies in those regions.
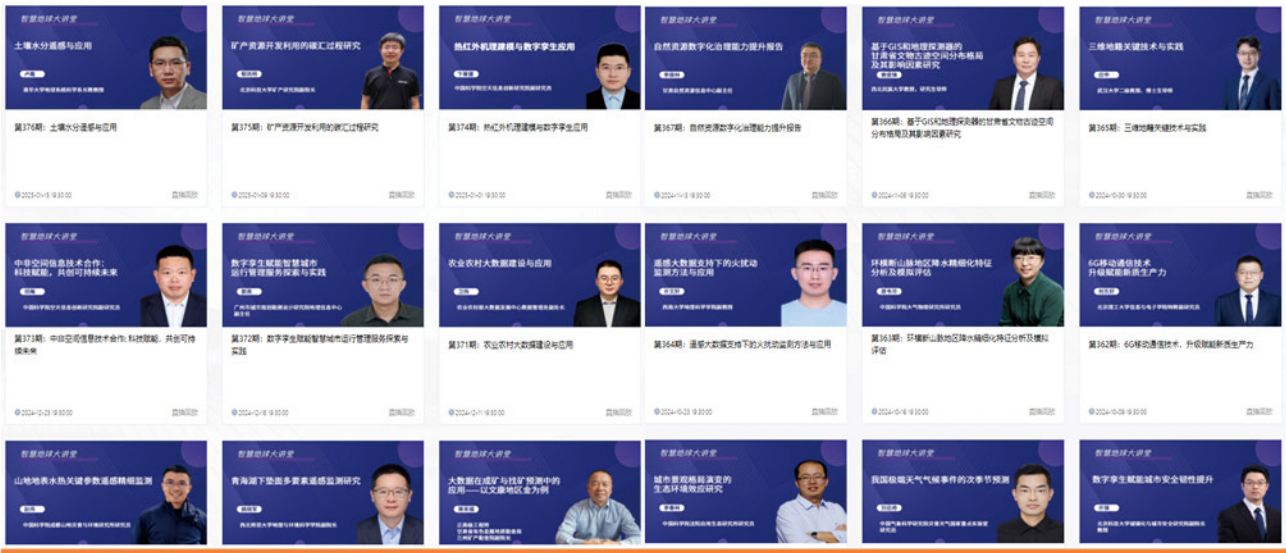
# Taking an Integrated Approach to Industry, Research, and Education

PIESAT has long been committed to an integrated approach to industry, education, and research. PIESAT adopts a three-pronged approach to collaboration known as "PIE into Campus," "Research Cooperation," and "Talent Development." Through this integrated cooperation model, the Company aims to deepen the integration of industry and education by involving enterprises in educational activities, bringing educational institutions into the corporate world, and jointly advancing the fusion of production and education. The collaboration facilitates the organic connection of the education chain, talent chain, innovation chain, and industry chain. By aligning with the latest demands of industrial and technological development, PIESAT contributes to driving reforms in university talent development and nurturing applied talents urgently needed by the national economy.
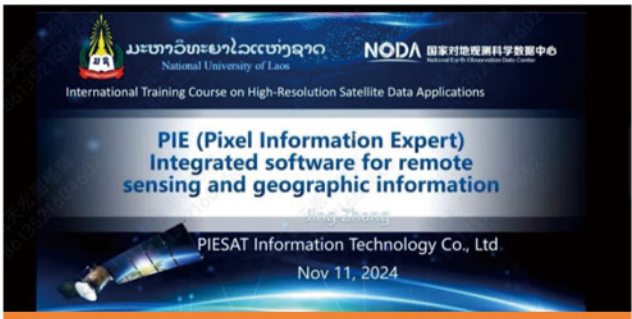
Smell the Flood and Move, Do Flood Control and Disaster Reduction Strong Backing

Starting from June 22, 2024, various regions across China entered a critical phase of flood prevention and disaster relief. PIESAT, leveraging the capabilities of the PIESAT-1 satellite, provided technical support for formulating scientific defense decisions nationwide, significantly enhancing the capacity to withstand flood incursions. This support has been instrumental in emergency monitoring efforts in Huangshan City, Anhui Province; rainfall emergency monitoring in the Liuyang River region; imaging of Wuhan City, Hubei Province; continuous tracking and monitoring of the dike breach and subsequent closure at Tuanzhouyuan on Dongting Lake in Huarong County, Hunan Province; monitoring of the highway bridge collapse in Zhashui County, Shangluo City, Shaanxi Province; monitoring of the projected landing points and pathways of Typhoon Gaemi; monitoring in Horqin Left Wing Rear Banner, Tongliao City, Inner Mongolia; emergency monitoring in the Wusuli River region; imaging of the dike breach area at Sixin Dike on the Juanshui River in Hunan Province; emergency monitoring of the dike breach risk at the Laoha River in Chifeng City, Inner Mongolia; emergency monitoring of the dike breach risk at the right bank of the Wang River in Fanjiawopeng Village, Tieling City, Liaoning Province; and flood monitoring in Huludao City, Liaoning Province, among other flood prevention and disaster relief operations.

As of August 23, 2024, the PIESAT-1 satellite, with its outstanding performance and stable operational status, conducted a total of 117 emergency monitoring missions and delivered over 3,100 scenes of data, covering 23 provinces, autonomous regions, and municipalities directly under the central government, including Beijing, Shanghai, Liaoning, and Hunan. It supported and ensured multiple emergency monitoring tasks during China's "July to August" flood season, providing timely technical support to relevant ministries and commissions such as the Ministry of Water Resources and the Ministry of Emergency Management, as well as local administrative authorities. This has contributed significantly to the smooth progress of nationwide flood prevention efforts. In this context, PIESAT launched a special column titled "Case Studies of "Nuwa Constellation" Supporting Emergency Monitoring for Floods During the 2024 Flood Season," featuring a total of 19 typical cases.
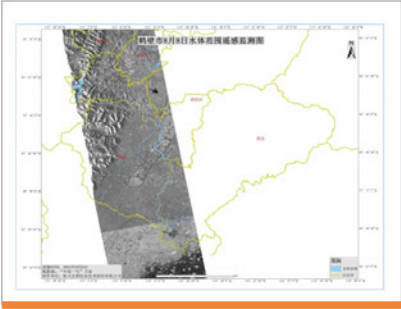

黑龙江省双鸭山市饶河县疑似受灾范围
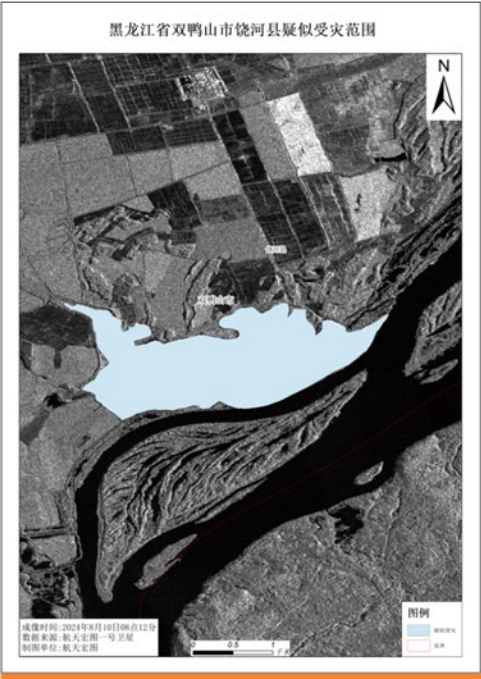
Suspected Disaster-Stricken Area Map of Raohe County, Shuangyashan City Along the Wusuli River on August 10
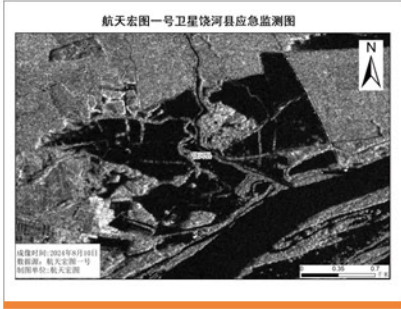

"航天宏图一号"卫星汛期调度覆盖范围图
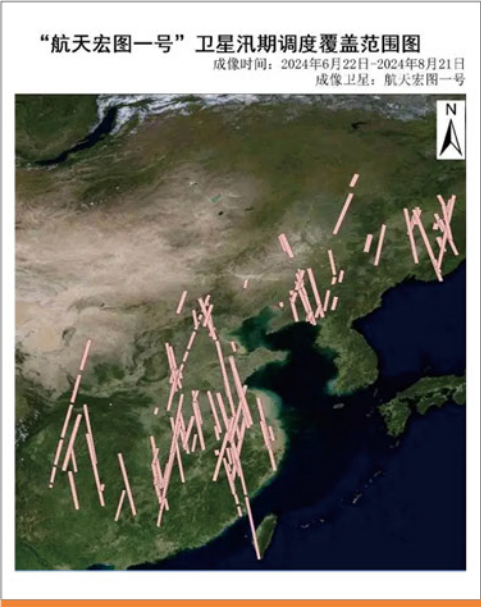
Coverage Map of PIESAT-1 Satellite Scheduling During the Flood Season

Remote Sensing Monitoring Map of Water Body Extent in Hebi City in July

Remote Sensing Monitoring Map of Water Body Extent in Hebi City on August 8

航天宏图一号卫星饶河县应急监测图

Satellite Image Emergency Monitoring Map of Raohe County Along the Wusuli River on August 10

Providing Support to the Beijing Hydrological Station for the On-site Promotion Meeting on the Construction of the Ministry of Water Resources' Modern Rainfall and Water Situation Monitoring and Forecasting System

On June 3, 2024, as the technical support provider for the Beijing Hydrological Station, PIESAT offered hydrological emergency testing and technical support services before and during the on-site promotion meeting for the construction of the Ministry of Water Resources' modern rainfall and water situation monitoring and forecasting system. During the on-site promotion meeting, the PIESAT technical team utilized advanced technological equipment jointly developed with the Beijing Hydrological Station, including multi-rotor UAV, radar flow meters, water sampling devices, and real-time video transmission systems. These technologies were employed to ensure the smooth execution of tasks such as hydrological cross-section topographic mapping, flow measurement, water sampling, and live video streaming at the event venue.

Science Popularization Enlightens Minds and Intelligence Shapes the Future

On August 15 and August 23, 2024, the Gaochun District Media Convergence Center in Nanjing, in collaboration with the Gaochun District Science and Technology Association, the Spatio-temporal Big Data Working Committee of the Jiangsu Association for Surveying, Mapping, and Geoinformation, and Nanjing PIESAT Information Technology Co., Ltd. (hereinafter referred to as "Nanjing PIESAT"), jointly organized a PIESAT satellite remote sensing science popularization and education event at the Gaochun District Media Convergence Center. The event was open for registration on a first-come, first-served basis, and the slots quickly filled up once registration opened. A total of 60 primary school students from Grades 4 to 6 were confirmed to participate in this fascinating journey to explore science and technology.

MR Empowers Education and Creates New Immersive Learning Experiences

Leveraging its expertise in remote sensing and geographic information, PIESAT has developed an MR+Education Solution built upon an integrated "Air-Space-Ground" sensing network comprising satellites, UAV, and ground sensors. By incorporating advanced technologies such as cloud computing, big data, artificial intelligence, and game engines, the solution transcends the temporal and spatial constraints of traditional teaching, offering students a one-stop service for experiential practical training, assessment exercises, and experimental grading. Currently, related products have been deployed across various educational levels, including undergraduate institutions, vocational colleges, secondary vocational schools, and primary and secondary schools. The application scenarios are designed to establish an MR+education practical training and teaching base with a "one platform and four centers" framework, primarily serving professional practical training, general public practical teaching, experiential science popularization, and virtual simulation research and innovation teaching. These products aim to address the three pain points in traditional teachings, namely high investment, high wastage and high risk, as well as difficulties in implementation, observation, and reproduction. This represents an important initiative to integrate modern information technology into experimental teaching projects, broaden and deepen the scope of experimental teaching content, extend the time and space of experimental teaching, and enhance the quality and standard of experimental teaching.

Presentation of Theoretical Knowledge on Remote Sensing Technology and Its Applications via MR Headsets | Virtual Simulation Teaching System for Marine Surveying and Mapping | Remote-Sensing Virtual Simulation Teaching System

MR empowers the cultural and tourism industry, unveiling a new era of smart tourism. Leveraging technologies such as mixed reality, virtual-real space anchoring with multi-user collaboration, edge computing, and rendering, exhibition spaces like museums and memorials are no longer confined to physical boundaries, nor are visitors limited to mere observation and listening. Instead, there is a shift towards promoting an immersive, composite experience that blends historical and cultural content across virtual and real spaces, facilitated by natural gesture interactions. By wearing MR smart wearable devices, participants can engage in interactive operations like gestural clicking, swiping, and pinching, thus fostering emotional connections and bridging the temporal and spatial gaps with historical figures. This integration of visual, auditory, tactile, force, perceptual, and intuitive senses culminates in a genuine physiological and psychological experience. Accurate mapping of historical data onto reality constructs a spatiotemporal corridor, where the fusion of virtual and real elements creates a fusion of history and future, achieving a mind flow experience for visitors. Simultaneously, it enables multiple users to share virtual cultural scenarios, enhancing interactive operability and social entertainment, and offering users a novel cultural consumption experience in digital cultural tourism that transcends temporal and spatial limitations.

Honors of 2024

Awarding Date	Award Name	Awarding Institution
2024	Typical Practice Cases of Boards of Directors of Listed Companies in 2024	China Association for Public Companies
2024	Excellent Cases of Annual Report Performance Briefings	China Association for Public Companies
2024	Best Investor Relations Award	Hithink RoyalFlush Information Network Co., Ltd.
2024	2024 ESG Value Communication Award for Listed Companies	Easy Board
2024	2024 Beijing Top 100 High-Tech and Advanced Enterprises	Beijing Enterprise Confederation, Beijing Entrepreneurs Association
2024	2024 Beijing Top 100 Enterprises in the Digital Economy	Beijing Enterprise Confederation, Beijing Entrepreneurs Association
2024	2024 Beijing Top 100 Enterprises in the Service Sector	Beijing Enterprise Confederation, Beijing Entrepreneurs Association
2024	Second Place in Subject 1 and Fifth Place in Subject 2 in the Remote Sensing Data Intelligent Application Category of the 4th "Tianzhi Cup" Artificial Intelligence Challenge	Beihang University and Chinese Association for Artificial Intelligence
2024	Silver Award of National Excellent Surveying and Mapping Engineering	Chinese Society for Geodesy Photogrammetry and Cartography
2024	2024 Accreditation of Independent Innovation Products in Surveying, Mapping and Geoinformation	Chinese Society for Geodesy Photogrammetry and Cartography
2024	First Prize of the 2024 Geoinformation Science and Technology Progress Award	China Association for Geospatial Industry and Sciences
2024	China Multimedia Enterprise Innovative Product Award, Excellent Service Contribution Enterprise	China Multimedia Conference (co-organized by the China Society of Image and Graphics (CSIG) and the China Computer Federation (CCF))
2024	President Wang Yuxiang Honored as a "Meritorious Citizen in Hebi"	Hebi Municipal People's Government
2024	2024 Integrity Enterprise in the Software and Information Service Industry	Beijing Software and Information Service Industry Association

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Reader Feedback

Dear readers,

Thank you very much for taking time out of your busy schedule to read the *2023 Annual ESG Report of PIESAT Information Technology Co., Ltd.* To provide you and other stakeholders with more valuable information and effectively promote the Company to improve its ability and level of fulfilling social responsibilities and optimize the quality of ESG reports, we are sincerely looking forward to your opinions and suggestions.

Multiple-choice (please tick your choice)

1. Your overall assessment of this Report:

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

2. What do you think of the responses to and disclosure of the concerns of stakeholders in this Report?

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

3. What do you think of the performance of PIESAT in fulfilling its social responsibilities?

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

4. What do you think of the performance of PIESAT in energy conservation and environmental protection?

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

5. What do you think of the performance of PIESAT in business management?

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

6. What do you think of the clarity, accuracy and completeness of the information, indicators and data disclosed in this Report?

☐ Very good   ☐ Good   ☐ General   ☐ Bad   ☐ Very bad

7. Do you think the layout and design of this Report are reader-friendly?

☐ Yes   ☐ No

■ What do you say about PIESAT and the content of this Report?

_____

_____

■ Your contact information:

Name _____   Tel _____   Employer _____   Position _____

Email _____   Postal address _____