

Annex F14.B.
(Non - Confidential version)

Guiding Catalogue of key products and services in strategic emerging industries (EN)

Annex to OFC Application Form

annex

Guidance Catalogue of Key Products
and Services for Strategic Emerging
Industries
(2016
edition)

revised statement

In order to implement the "Thirteenth Five-Year Plan" (hereinafter referred to as "the Plan"), the National Development and Reform Commission, together with the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Ministry of Finance and other relevant departments have revised and improved the 2016 edition of the "Catalogue of Key Products and Services for Strategic Emerging Industries" (hereinafter referred to as "the Catalogue") according to the new changes in the development of strategic emerging industries by consulting the Expert Committee on Strategic Emerging Industries and soliciting opinions from the whole society online. In accordance with the new changes in the development of strategic emerging industries, the National Development and Reform Commission, the Ministry of Science and Technology, the Ministry of Industry and Information Technology, the Ministry of Finance and other relevant departments have revised and improved the 2013 Catalogue of Key Products and Services for Strategic Emerging Industries (hereinafter referred to as the Catalogue) to form the 2016 edition.

The 2016 edition of the Catalogue is based on the eight industries in the 5 broad areas identified in the Plan, and is further developed by the Government.

The company's products and services have been progressively refined to 174 nearly one sub-direction 40 under one key direction, with nearly 4000 one subdivision.

We welcome the community's continued input on changes and improvements to the 2016 edition of the Directory at 修改意见可发送邮件至 xxcytcxtdc@ndrc.gov.cn.

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1 New generation information technology industry

1.1 Next Generation Information Network Industry

1.1.1 network equipment

New-generation mobile communications equipment. It mainly includes access network equipment and core network equipment based on 4G mobile communication technology (including LTE, LTE-Advanced broadband wireless mobile communication technology and its subsequent evolution) and 5G. Among them, mobile communication base station equipment supports 20MHz system bandwidth and transmission data rate of 100Mbps downstream/50Mbps upstream.

Next-generation Internet equipment. Including core router, single slot processing capacity $\geq 400\text{Gbps}$, overall processing capacity $\geq 6.4\text{Tbps}$ (bidirectional), supporting

Multiple rate interfaces such as 10Gbps/40Gbps/100Gbps, and also including large-scale cluster routers for

Internet backbone nodes and data interconnection center nodes, should support at least $2+x$ ($x \geq 4$) Broadband network access servers, Ethernet switches, Layer 3 switches,

OpenFlow switches that support multiple rate interfaces such as 10Gbps/40Gbps/100Gbps and support IPv6 routing protocols.

Optical communication equipment. Including optical fibers, G.657 optical fibers for FTTx, large effective area G.655 optical fibers, G.656 optical fibers, low-loss and ultra-low-loss optical fibers conforming to G.652 standard, photonic crystals and photonic bandgap optical fibers with new materials or special structures, rare earth doped optical fibers, few-mode optical fibers for future ultra-large capacity transmission, multi-core optical fibers, vortex (spiral) optical fibers, and some special properties of new optical fiber, such as plastic optical fiber, poly

The optical transmission equipment, single-pass line rate 10Gbit/s, 40Gbit/s, 100Gbit/s, 200Gbit/s, 400Gbit/s and support flexible raster multi-rate. Optical transmission equipment, single-pass line rates of 10Gbit/s, 40Gbit/s, 100Gbit/s, 200Gbit/s, 400Gbit/s and very high-capacity dense wavelength division multiplexing (DWDM) equipment supporting flexible raster multi-rate, reconfigurable optical splitting and multiplexing equipment (ROADM) optical cross-connect (OXC) ~~aim~~ high-capacity, high-rate optical transport network (OTN) equipment, metro-access active and passive wavelength division multiplexing (WDM) equipment, optical interconnect equipment, packet transport network (PTN) equipment, packet enhanced OTN (POTN) equipment, intelligent optical network equipment (ASON), software-defined optical transport equipment (SDTN) multi-service Transport and Access Equipment (MSTP/MSTP) Optical access equipment, 10G rate single wavelength PON equipment, 40G and above rate wavelength tunable laser based multi-wavelength PON equipment, wavelength routing method dense WDM PON equipment, indoor visible light access equipment using illuminated LEDs.

Network equipment and terminal test/metering equipment. Metrological calibration of test and test instruments for system equipment and terminal equipment that make up communications networks, including comprehensive testers for terminal equipment, test systems for communications base stations, test systems for transmission/access/data equipment, and test instruments for metrology.

Cloud computing equipment. This includes cloud storage systems and equipment, mainly including storage servers (HDD or SSD) or disk arrays and other storage devices used for data storage on cloud platforms, as well as storage management systems based on distributed storage technology. Servers, mainly including servers for cloud computing systems, including hardware and software systems, to meet the requirements of low power consumption, high density, etc. In some scenarios, customized servers and whole cabinet servers are required

etc. Network equipment, mainly including switches, routers and other equipment used to interconnect different devices in the cloud platform, and need to support Layer 2 multi-path, virtual machine access and other technologies, and in some scenarios need to support SDN technology. Cloud platform system, mainly including the platform and system integrated by hardware and software facilities used to support cloud services, including virtualization, resource management, business management, operation and maintenance functions.

IoT Devices. Including sensors and node devices, optical fiber sensors, MEMS sensors, smart sensors, multi-function sensors, chemical and biological sensors, high-definition image sensors, etc., low-power consumption, miniaturization, multi-function, high-performance, integrated sensing node devices, extreme environment sensor node devices, etc. RFID reader/tag, high-frequency, ultra-high frequency, active RFID tags and reader devices, etc. IOT terminal equipment, M2M terminal, RFID and mobile communication integrated terminal, IOT communication terminal module, IOT intelligent terminal operating system

and middleware, etc. Proximity wireless communication node equipment, various low-power and low-cost proximity wireless communication equipment. IoT gateways, including M2M gateways, Telematics gateways and other kinds of IoT gateways. Narrowband IoT (NB-IoT) terminal equipment and base station equipment. IoT data open platform. IoT logo resolution equipment. Positioning system equipment, BeiDou global positioning system (GPS) terminal and equipment, RTLS positioning system, etc. IoT security devices.

Next-generation radio and television network equipment. This includes broadband access equipment, reception equipment, backbone switching and transmission equipment, and converged media distribution network equipment for next-generation radio and television networks. Broadband access equipment supports optical fiber, coaxial cable and other transmission media, and can provide gigabits per

The backbone network switching and transmission equipment supports high-speed transmission, switching and quality of service requirements for data traffic in both planes of broadcast programs and broadband data, and supports protocols such as IPv6 and multicast VPN; wired and wireless converged transmission and distribution equipment supports wired and wireless cooperative transmission and coverage of broadcast TV bands to realize cooperative distribution of converged media; the converged media distribution network supports cross-domain distribution of converged media services to ensure user experience. The converged media distribution network supports cross-domain distribution of converged media services to ensure the user experience of the services. Terrestrial digital TV and mobile multimedia broadcasting transmitting and receiving equipment, live satellite ground receiving equipment, etc.

Digital home products. Refers to digital home smart terminals, smart sensing and control devices, bridging devices, gateway devices, etc.

Digital Video Surveillance System. Including network

camera equipment, video surveillance storage, processing and intelligent control equipment, and monitoring back-end systems.

1.1.2 Information terminal equipment

Next-generation mobile terminal device. Includes smartphones, which are smartphones equipped with operating systems, support for multi-core technology, multi-touch support, multiple modes such as app stores and web applications, and support for features such as multi-sensors and augmented reality. Handheld tablets, which are portable, compact, handheld personal computers that use a touch screen as the basic input device. Other mobile smart terminals, including in-vehicle smart terminals, etc.

Wearable terminal device. Support new display technology, new touch technology, augmented reality technology, voice and image recognition, somatosensory operation technology and other new human-computer interaction technology, with a variety of sensing capabilities and wireless technology, with hardware and software integrated solutions for the whole machine

case, applications and supporting application support systems.

Satellite mobile communications, navigation terminals. Including mobile satellite communication terminals, terminals that use geostationary satellites or medium- or low-orbit satellites as relay stations to achieve mobile communication on a regional or even global scale. Includes vehicle-mounted, ship-mounted, airborne terminals and handhelds. Satellite navigation and positioning receivers, receiver equipment that receives broadcast navigation signals from satellite navigation and positioning systems, such as BeiDou, for navigation and positioning functions.

Next-generation broadcast television network terminal equipment. Including intelligent home multimedia gateways supporting media convergence services, supporting external wired and wireless broadband interconnection, with the networking capability of home media devices; intelligent set-top boxes, devices supporting 4K, 8K video decoding capability, supporting physical, voice and other control functions, supporting the convergence of

broadcast network and broadband data network services presentation, can support a variety of presentation terminals.

Other communication terminal devices. This includes smart home gateways, smart routers, smart terminals that support hot-swappable data cards, and smart terminals that support hot-swappable other communication cards.

1.1.3 Network Operations Services

New generation mobile communication network operation services. This includes the construction and organization of new-generation mobile communications core networks, the construction and organization of new-generation mobile communications access networks, the optimization and maintenance of new-generation mobile communications networks, and new-generation mobile communications services.

Next Generation Internet Operation Services. Refers to backbone networks, metropolitan networks, access networks, content distribution networks, data centres based on IPv6 technology and IPv4/IPv6 transition technology

and the operation of the business platform.

Fibre-optic broadband network operation services. Includes home user fiber access service, which refers to the fiber to the home service for home (individual) users. Business user fiber optic access service, which refers to the service of providing Internet broadband access for businesses using fiber optics. Other related access services, refers to other equipment and networking services related to fiber optic access, such as the construction and services of subscriber premises network, etc. Fiber rental services, means the fiber rental services such as duct and communication fibers and wavelengths provided by operators for customers. Rental digital circuit service, means the service of renting digital circuits to provide high-speed digital information transmission to customers.

Next-generation radio and television network operation services. It includes the construction and networking of next-generation broadcast television network based on cable, wireless and satellite, and the interconnection and interoperability of operators'

networks and services. Next-generation broadcast TV network audio and video services refer to audio and video services for TV terminals and mobile terminals, such as HD, 4K, 8K digital TV and interactive TV services, relying on the next-generation broadcast TV network; next-generation broadcast TV network data and information services refer to data and Internet information services relying on the next-generation broadcast TV network; next-generation broadcast TV network voice services refer to IP voice services relying on the next-generation Next Generation Radio and Television Network Voice Service refers to IP-based voice services based on the Next Generation Radio and Television Network; Satellite Live TV Service refers to TV services based on satellite broadcast transmission technology.

Satellite communication operation services. This refers to operational services based on mobile, broadband and other satellite communication systems, navigation and positioning, high-precision network synchronization and timing operational services based on the BeiDou satellite navigation system and BeiDou ground-based augmentation system, etc.

Industrial interconnection network operation services, mainly divided into in-plant networks and out-plant networks.

1.2 Information technology services

1.2.1 Emerging Software & Services

Infrastructure software. Includes general-purpose infrastructure software, embedded operating systems and databases, new networked infrastructure software, and infrastructure software and support tools for critical information infrastructures.

Cloud computing software and services. Cloud computing software includes virtualization management software, new generation of massive information intelligent search software, data mining software, cloud convergence application operation support platform software, metrics and billing, management and operation, and other software products that support cloud computing technology and facilities services. Cloud computing services include Software as a Service (SaaS), Platform as a Service (PaaS), and Facility as a Service (IaaS). Cloud computing services in industry and other areas.

Mobile computing software platform. Including mobile service operation support and development platform, intelligent mobile terminal software system.

Data processing and storage services. Includes data processing and handling services, storage services, etc.

Industrial Software. Including software embedded inside high-end equipment, product development and design software software, product manufacturing process management and control software, operation management and collaboration software, energy saving and emission reduction control and support software, and highway traffic management and decision making software.

Radio and television network maintenance and operation support software. Including network management, subscriber management, digital media content management, operation support system, middleware, smart TV operating system software, etc.

Information technology consulting services. Including information technology planning services, information technology management consulting services, information system engineering supervision services, testing and evaluation certification services, and information technology training services.

Information system integration services. Includes information system design services, information system integration and implementation services, and information system operation and maintenance services.

High-end IT service support software. Including IT consulting design support tool software, system integration implementation support tool software, system operation and maintenance support tool software, data processing support tool software.

IoT application services. It mainly includes IOT

application services in the fields of intelligent transportation, power grid, water, medical, environmental protection, logistics, security, heating, gas supply, monitoring, public security, etc.

Blockchain technology related products and services.

1.2.2 "Internet+" application services

It mainly includes application services in "Internet+" entrepreneurship and innovation, collaborative manufacturing, modern agriculture, smart energy, inclusive finance, beneficial services (education, medical care, employment, social security, radio and television, smart community, etc.), efficient logistics, e-commerce, convenient transportation, green ecology, etc.

Public information services. These include public services such as identification of market subjects, market information management and sharing, security of market transactions, and public services such as e-commerce dispute handling, dispute mediation, legal advice, and online credit information services.

1.2.3 Big Data Services

Use distributed parallel computing, artificial intelligence and other technologies to compute, analyze and mine massive amounts of heterogeneous data, and apply the resulting information and knowledge to practical production and life. This includes new business models such as data prospecting, data chemistry, data materials, and data pharmaceuticals.

1.3 Electronic core industry

1.3.1 integrated circuit

Integrated circuit chip design and services, chip design platforms (EDA tools) and supporting IP libraries.

Integrated circuit chip products. Mainly including central processing units (CPUs), microcontrollers

(MCUs), memories, digital signal processors (DSPs), embedded CPUs, communication chips, digital TV chips, multimedia chips, information security and video surveillance chips, smart card chips, automotive electronics chips, industrial control chips, smart grid chips, MEMS sensor chips, power control circuits and semiconductor power electronic devices, optoelectronic hybrid integrated circuits, etc.

Integrated circuit chip manufacturing, line width 100 nm and below, large-scale digital integrated circuit manufacturing, 0.5 micron and below, analog, digital and analog integrated circuit manufacturing.

Integrated circuit chip packaging with SiP, MCP, MCM, CSP, WLP, BGA, FlipChip, TSV and other technologies.

Integrated Circuit Materials. It mainly includes 6-inch/8-inch/12-inch IC wafers, silicon on insulator (SOI), compound semiconductor materials, photoresists, targets, polishing solutions, grinding solutions, packaging materials, etc.

Integrated circuit equipment. It mainly includes lithography machines, etching machines, ion implanters, annealing equipment, single crystal growth equipment, thin film growth equipment, chemical mechanical polishing equipment, packaging equipment, test equipment, etc. used in 6-inch/8-inch/12-inch IC production lines.

1.3.2 New display devices

New display panels (devices). Mainly including high-performance amorphous silicon (a-Si)/low temperature polysilicon (LTPS)/oxide (Oxide) liquid crystal display (TFT-LCD) panel products; new active organic electroluminescent diode (AMOLED) panel products; new flexible display, laser display, stereoscopic display,

quantum dot light-emitting diode (QLED) display device products, etc.

New display materials. Mainly including 6th generation and above glass substrate, high performance hybrid liquid crystal, driver IC, high purity target material, high performance long life organic light emitting material, quantum dot material, 5.5 generation and above fine metal mask plate, high purity chemicals, flexible substrate material, high performance laser, etc.

New display equipment. Mainly including 5.5 generation and above plasma enhanced chemical vapor deposition equipment (PECVD), magnetron sputtering equipment (Sputterer), exposure machines, excimer laser annealing equipment, organic vapor deposition equipment, inkjet printing equipment, etc.

1.3.3 New Components

New chip components, new electro-acoustic components, new connecting components, superconducting filters, high-density interconnect printed circuit boards, flexible multilayer printed circuit boards, special printed circuit boards, energy-saving and environmentally friendly electronic transformers, low-loss microwave and GHz band anti-EMI/EMP components and other electronic components, low-cost fiber optic cables, fiber optic prefabricated rods and related optical devices for a new generation of communications, high-speed A/D and D/A devices, broadband power amplifiers and filters for mobile communication, quartz crystal oscillators for communication base stations, connectors and cable assemblies for new communication equipment.

Miniaturized, integrated, intelligent and networked sensitive components and sensors. Semiconductor laser devices, high-performance all-solid-state laser devices, high-performance sensitive components, new crystal devices, high-precision resistor devices. New Sensors. Key optoelectronic devices, semiconductor light-emitting diodes (LEDs), new vacuum switch tubes, special-purpose vacuum devices and other semiconductor devices. Nano power generation functional devices. Fiber laser devices. New cables such as aluminum alloy cables, composite submarine cables and high-voltage ultra-high voltage cables.

Power electronic power devices, including metal oxide semiconductor field effect tubes (MOSFETs), insulated gate bipolar transistor chips (IGBTs) and modules, fast recovery diodes (FRDs), vertical double diffusion metal-oxide field effect transistors (VDMOS)

Thyristor (SCR), high power thyristor (GTO) over 5 inches, integrated gate commutated thyristor (IGCT), small and medium power intelligent modules.

1.3.4 High-end energy storage

Materials and devices for energy storage devices. Anode materials include lithium-rich materials such as olivine phosphates (such as lithium iron phosphate), spinel-type lithium manganate materials, layered materials (such as nickel-cobalt aluminum and nickel-cobalt manganese, etc.) and their hybrid materials; anode materials include lithium titanate materials, graphite-based materials (such as artificial graphite and natural graphite, etc.), hard carbon materials, soft materials and silicon-based composites; electrolyte materials include lithium hexafluorophosphate carbonate solutions and other new electrolyte salts; diaphragm materials include polyolefin and other new battery diaphragm materials; copper foil, aluminum foil and aluminum plastic film and other auxiliary materials; power control chips. Electrolyte materials include lithium hexafluorophosphate carbonate solution and other new electrolyte salts, etc.; diaphragm materials

include polyolefin and other new battery diaphragm materials; auxiliary materials such as copper foil, aluminum foil and aluminum plastic film; main control chip for power control (MCU), Power Processing Module, Voltage Sensor.

Energy storage devices and their management systems. Lithium-ion battery monoblocks, modules and systems; supercapacitor monoblocks, modules and systems; new system power battery monoblocks, modules and systems; hybrid energy storage power modules and systems; modular NiMH battery energy storage systems; battery management systems, supercapacitor management systems.

1.3.5 Key Electronic Materials

Semiconductor materials. Including silicon materials (silicon single crystal, polished wafers, epitaxial wafers, insulating silicon, germanium silicon) and compound semiconductor materials, substrate materials such as sapphire and silicon carbide, raw materials for epitaxy such as metal organic sources and ultra-high purity gases, high-end LED packaging materials, high-performance ceramic substrates, etc.

Optoelectronic materials. Including optical fiber materials, solid-state laser materials and optoelectronic display materials and other basic optoelectronic materials, quartz-based optical fiber cable materials, non-oxide optical fiber materials, laser crystals, semiconductor light-emitting materials, transparent conductive film materials, optical crystal materials, optoelectronic detection materials. New electronic component materials. Including high-end special materials such as magnetic materials, ceramic materials, piezoelectric crystal materials, high-frequency copper-clad plates for communication systems and related materials, electronic lead-free solder, thick film materials, etc. Gas-sensitive, moisture-sensitive, light-sensitive, heat-sensitive materials, giant magnetic impedance and other sensing materials.

1.3.6 Electronic special equipment instruments

Equipment for coating, sputtering, etching for semiconductor production. High-precision automatic printing machine, high-speed multi-functional automatic placement machine, lead-free reflow welding machine and other

electronic components surface mounting and complete assembly equipment. High-performance permanent magnetic components production equipment, metalized ultra-film power capacitors production equipment, ultra-small chip components production equipment, high-density printed circuit board production equipment and other new electronic components equipment. High-end electronic measurement instruments, TD-LTE and other new generation communication and network test instruments, digital-analog mixed-signal integrated circuit test systems, memory testers, analysis test instruments and other semiconductor and integrated circuit test instruments, digital TV signal sources, digital audio and video testers, image quality analyzers, network quality and security testers, etc.

1.3.7 Other High-end Complete Products

HD broadcast television production and broadcasting equipment. High-performance security servers and storage devices. Medical electronics, financial electronics, automotive electronics and other areas of application of electronic products and convergence innovation system

Systems. Industrial control equipment.

1.4 Network Information Security Products and Services

1.4.1 Network and information security hardware

Network and information security hardware can be divided into security application hardware products and security authentication hardware products. Among them, network and information security application hardware mainly includes firewall/VPN devices, unified threat management system (UTM), intrusion detection system (IDS), intrusion prevention system (IPS), advanced sustainable attack (APT), high-performance security isolation and information exchange system, high-performance anti-virus gateway, network virus monitoring system (VDS), network audit system, network vulnerability scanning and patch management products, WEB application firewall, unified security management platform, anti-denial-of-service attack products, Internet behavior management products, in-depth traffic/packet monitoring equipment, network illegal information identification and control equipment, network and data disaster recovery and backup equipment, etc. Network and

information security authentication hardware mainly includes biometric systems, smart cards, authentication tokens, etc.

1.4.2 Network and Information Security Software

Trusted computing security software, security operating systems, security databases and other basic network and information security software products. Network and border security software products such as high-performance firewall software, unified threat management platform software, network behavior monitoring software, etc., deployed on network equipment, communication terminals or security domain boundaries, used to support a new generation of information network applications and defend against network attacks. Network illegal information monitoring and discovery, positioning management system, network illegal behavior tracking and positioning, forensic system and other illegal information and behavior monitoring and management

Products of this type. Identity management and access control products such as PKI, enhanced authorization, single sign-on control, and reliable electronic signature application security software that prevent unauthorized leakage, alteration, and destruction of information systems or terminal data. Content and threat management software products that manage and support basic services and reduce network and information security risks in the course of operation. Support system security assurance and business application security risk assessment, security assessment and other network and information security support software products, etc. Industrial control system vulnerability mining, detection tools, industrial control system intrusion detection system, industrial firewall and other information security products for the industrial field.

1.4.3 Network and Information Security Services

Network and information security consulting services, information system security integration, network and information security operation and maintenance services, network and information security

risk assessment, information system level protection consulting, attack protection services, encryption and confidentiality services, network and information security emergency services, network and information security testing services, as well as electronic certification, network and information security certification, network and information security training, e-discovery, security audit, data backup and disaster recovery services, network and information security education and training, etc.

Basic service management and support and security management software products to reduce security risks in the operation process. Support system security and business application security risk assessment, security assessment and other security support software products, etc. Information security consulting services, information system security integration, network security maintenance services, information security risk assessment, information system level protection consulting, attack protection services, encryption and confidentiality services, network security applications

Emergency services, security testing services, and e-certification, information security certification, information security training, e-discovery, security audit, data backup and disaster recovery services, etc. Security situational awareness, early warning, security risk assessment, security consulting and other information security services for industrial control systems.

1.5 artificial intelligence (AI)

1.5.1 Artificial Intelligence Platform

Artificial intelligence public service platform, including open data platform, basic resources and technology platform, and dual-innovation service platform.

The public data platform for artificial intelligence includes a massive training repository and standard test datasets for multiple types of artificial intelligence such as text, speech, image, video, map and industry application data that are open to the society.

The basic resources and technology platform for artificial intelligence includes a new computing cluster

sharing platform to meet the needs of deep learning and other intelligent computing, a cloud-based intelligent analysis and processing service platform, an open platform for algorithms and technologies, a public service platform for the security of intelligent systems, a basic identity authentication platform for multiple biometric identifications, and a basic service platform for brain-like services for cutting-edge research.

Artificial intelligence dual-innovation service platform is a public platform that provides specialized innovation and entrepreneurship services such as R&D tools, inspection and evaluation, security, standards, intellectual property rights, and entrepreneurship consulting in the field of artificial intelligence.

1.5.2 Artificial Intelligence Software

The main topics include theory and algorithms, basic software, and application software.

Artificial intelligence theories and algorithms include deep learning, brain-like intelligence and other theories and algorithms. Deep learning refers to deep learning theories and algorithms based on perceptual data, multimedia, natural language and other big data, and brain-like intelligence refers to cutting-edge theories and algorithms in the field of brain-like intelligence such as brain-like neural computing systems and brain-like information processing.

Artificial intelligence infrastructure software includes software technologies such as operating systems, middleware, and development tools optimized for artificial intelligence, including open source software development platforms or function libraries. Artificial intelligence application software includes computer audiovisual, biometric recognition, complex Environment recognition, new human-computer interaction, natural language understanding, machine translation,

intelligent security warning and control, intelligent decision control, network security and other application software technologies.

1.5.3 Intelligent robots and related hardware

This includes intelligent industrial robots, intelligent service robots, special robots, and important devices including processors and intelligent sensors geared towards artificial intelligence.

1.5.4 Artificial Intelligence Systems

Artificial intelligence system includes artificial intelligence general application system, industry application system. Artificial intelligence general application system mainly includes comprehensive application of artificial intelligence technology Biometric verification system, intelligent search system, intelligent translation system, intelligent customer service system, etc. Artificial intelligence industry application systems mainly include in manufacturing, health care, education, and environment, transport, commerce, finance, logistics, culture, cybersecurity, social governance, the

Artificial intelligence systems in important productive and public service areas such as people-friendly services. Typical application systems such as smart home, smart car, smart unmanned system, smart security, smart health and other smart application systems.

2 High-end equipment manufacturing industry

2.1 Intelligent manufacturing equipment industry

2.1.1 Intelligent measurement and control devices

Intelligent control system, refers to CNC machine tools, basic manufacturing equipment, process industrial equipment and other manufacturing equipment, to achieve the control function of the industrial control system. Including machine tool numerical control system, decentralized control system, field bus control system, programmable control system, embedded special control system, safety control system, industrial computer system, etc.

Intelligent instrumentation refers to instruments and meters used in discrete manufacturing and process industrial equipment to continuously measure variables such as temperature, pressure, flow, and level, or to measure physical parameters such as object position,

tilt, and rotation, as well as material composition. It includes sensors and their systems, intelligent (temperature, pressure, flow, level) measuring instruments and meters, intelligent actuators, special variable online measuring instruments and meters, intelligent experimental analysis instruments, online analysis instruments, online non-destructive testing instruments, online material performance testing instruments, intelligent electric meters, intelligent water meters, intelligent gas meters, intelligent heat meters and their monitoring devices, and other intelligent instruments and meters.

2.1.2 Key Basic Components for Intelligent Equipment

High-speed precision heavy-duty bearings. Including P4, P2 grade high speed precision CNC machine tool bearings, P5, P4 grade high speed precision metallurgical rolling mill bearings.

High-speed precision gear transmission device, refers to the basic parts used to transmit power, realize mechanical conveying and lifting heavy objects, articulated chain and other high-speed precision mechanical transmission devices.

Servo control mechanism, a feedback control system that enables the output mechanical displacement (or rotation angle) to accurately track the input displacement and is used to accurately follow or reproduce a process. Includes high performance variable frequency speed control equipment, digital servo control systems, and networked distributed servo systems.

Liquid and gas tight components and systems, refers to the liquid and gas as the working medium, relying on liquid and gas pressure to transmit energy devices. Including high-pressure and high-flow hydraulic components

and hydraulic systems, intelligent valve islands, intelligent positioning pneumatic actuation systems, high-frequency loud electro-hydraulic servo valves and proportional valves, high-performance sealing devices, high speed and high-power hydraulic coupling speed control devices.

2.1.3 Industrial robots and workstations

Industrial robots replace humans in industrial production to do some operations such as handling, welding, assembly, painting, water cutting, etc.

Industrial robot workstation refers to a relatively independent work system with industrial robots as the main body and related devices to complete a certain process. The industrial robot workstation may form an automatic production line or other complex automated intelligent system with other workstations or devices.

2.1.4 Intelligent processing equipment

CNC machine tools, exponential value control of metal processing machine tools. Including CNC metal cutting machine tools, CNC metal forming machine tools, CNC special processing machine tools, etc.

Intelligent basic manufacturing equipment, which refers to intelligent equipment and systems and automatic production lines used for various forming, joining, heat treatment and surface treatment. This includes intelligent casting islands, intelligent welding systems, intelligent heat treatment production lines, intelligent forging production lines, intelligent equipment and production lines for the production of composite materials, etc.

2.1.5 Intelligent logistics equipment

Intelligent material handling equipment, refers to the intelligent equipment used for the movement and handling of materials within or between manufacturing workshops, including automatic guided vehicles (AGV), laser guided vehicles (LGV), intelligent suspension conveyor systems, etc.

Intelligent storage equipment, refers to intelligent equipment and systems that can automatically store and remove goods, including automated three-dimensional warehouses and their automatic identification systems, aisle stacker cranes, expert systems, etc.

Intelligent port handling equipment (intelligent equipment and systems for loading, unloading and conveying of containers and bulk cargo at automated terminals, including automatic container guiding vehicles, automatic lock picking devices, intelligent control systems for unmanned yards, remote control systems for port container cranes, etc.)

Agricultural products intelligent logistics equipment, refers to the micro-environment for agricultural logistics and agricultural products quality and safety and shelf life information intelligent monitoring and early warning forecasting of agricultural products storage and transportation equipment, agricultural products dedicated intelligent logistics packaging equipment, etc.

2.1.6 Intelligent agricultural equipment

Intelligent agricultural equipment refers to intelligent agricultural power machinery, efficient, accurate and environmentally friendly multifunctional farming equipment, efficient and intelligent harvesting equipment for grain crops, efficient and intelligent harvesting and intelligent control equipment for cash crops, intelligent fine production equipment for facilities, intelligent post-production drying and fine sorting equipment for agricultural products, and industrial processing and intelligent manufacturing equipment for food.

2.1.7 Additive manufacturing (3D printing)

Additive Manufacturing (AM) equipment is a technology that uses discrete materials (liquid, powder, filament, sheet, plate, etc.) based on 3D CAD design data to create solid objects based on the layer-by-layer accumulation principle. These include high energy beam sintering or melting of powder/filament materials, extrusion and hot melt forming of filaments, light curing of liquid resins, printing of liquids, bonding and welding of sheets

and plates, etc. Additive manufacturing related services.

2.2 aviation industry

2.2.1 Civilian aircraft (including helicopters)

60-90-seat new turbofan regional aircrafts and their improved models, 150-200-seat single-aisle mainline aircrafts and their improved models, 250-300-seat dual-aisle large mainline aircrafts and their improved models, new general aviation aircraft (including business aircraft), new helicopters, unmanned aerial vehicles and other aircraft and their key components and special equipment.

2.2.2 aero-engine

New turbofan engines, new turboshaft engines, new turboprop engines, new piston engines, turbine engines with the application of aviation biofuel and other civil aviation engines and components.

2.2.3 Aviation equipment and systems

Civil aviation airborne equipment and systems (avionics equipment and systems, electromechanical equipment and systems), airborne mission equipment and systems, air traffic control equipment and systems, ground support equipment and systems.

2.2.4 Aerospace materials

Civil aviation materials. Including new aerospace aluminum, magnesium, titanium alloys, composite materials, etc.

2.2.5 Aviation operations and support

Aviation demonstration operations, modern aviation logistics, aviation business services, aviation operation support services, civil aircraft customer services (including customer training, aviation material support, engineering services, technical publication whole life services and flight operation support), general aviation services, etc.

2.2.6 Aviation maintenance and technical services

Aviation maintenance, aviation remanufacturing, aviation technical services, etc.

2.3 Satellite and application industry

2.3.1 Space infrastructure

Spacecraft systems (including various types of application satellites), advanced satellite platforms and payloads, advanced satellite subsystem component products. Launch vehicles, rocket engines, advanced launch vehicle components. Spacecraft measurement and control ground stations, mobile measurement and control equipment. High-speed fully switched satellite remote sensing ground receiving system based on independent data source, satellite remote sensing data processing and storage system based on grid architecture, service-oriented satellite remote sensing data distribution system, remote sensing satellite ground calibration system and enhancement system. Remote sensing satellite ground authenticity testing field network with laboratory simulation test facilities and comprehensive test and evaluation system. Satellite communication uplink stations and gateway stations. Navigation satellite ground monitoring stations, navigation signal enhancement systems, etc.

2.3.2 Satellite communication application system

Communication satellite ground user terminals, portable multimedia terminals and cost-effective ground communication systems using new satellite communication technologies (new protocols), low-orbit data acquisition satellite application terminals, emergency disaster mitigation satellite communication application systems, broadband/high-frequency/laser satellite communication application systems. The ground terminal equipment and its key supporting parts related to the four major services such as satellite fixed communication service, satellite mobile communication service, television satellite live broadcasting service (satellite digital audio broadcasting) and Internet broadband access. Satellite communication equipment in mobile. Satellite search and rescue system ground station (MEOLUT) and user beacons. Digital content delivery services based on live satellite technology, and integrated information network services in heaven and earth. Chip products, antenna products, etc. adapted to satellite communication application systems.

2.3.3 Satellite Navigation Application Service System

Satellite navigation multi-mode augmentation application service system (including continuous observation network, real-time communication network, data processing center and public service platform), navigation information industry applications (including applications in various sectors and regions, such as high-precision deformation monitoring, traffic safety, emergency services, etc.), BeiDou-compatible multi-mode satellite navigation chips, personal mobile information terminal SOC chips, RNSS timing receivers, location-based comprehensive service system and its application service terminal (global navigation satellite system technology and indoor positioning technology combined with wireless communication network), vehicle and ship information system with multiple functions such as navigation, communication and audio-visual, personal navigation information terminal, compatible satellite navigation receiver, chip and embedded software for satellite navigation, BD-2 based weather and wind measurement terminal, high realistic navigation Electronic map.

Satellite navigation high-precision geodesic application platform, precise timing equipment, special test equipment for satellite navigation products, satellite navigation application system integration products, etc.

2.3.4 Satellite remote sensing application systems

Comprehensive application platform for satellite remote sensing system, standard products for remote sensing data, value-added products for remote sensing data. Satellite remote sensing application system in the fields of land mapping and monitoring, meteorological observation and service, resource inspection, urban planning management and monitoring, transportation, agriculture, forestry and water conservancy monitoring, geological exploration, marine monitoring, earthquake, environmental protection monitoring, disaster prevention and mitigation, earth system science and digital earth, satellite remote sensing regional application system, urban spatial information service. Remote sensing application support database and software, key equipment and instruments for remote sensing test observation, digital integrated application (3S+C) terminal. Aerial

remote sensing application system.

2.3.5 Integrated Satellite Technology Application System

Remote sensing, satellite communication and satellite navigation integrated information service platform, multi-data management scale information processing system, operational and standardized information terminal, application system in agriculture, ocean, forestry, water conservancy, resource city management, environmental protection, disaster prevention and mitigation, emergency rescue and other fields and key industries such as petrochemical and energy, location information network, broadband communication network and high-resolution remote sensing data service based Commercial consumer product terminals, wearable electronic devices and other products.

2.4 Rail Transit Equipment Industry

2.4.1 High-speed railway rolling stock and rolling stock

350km/h, 250km/h grade and higher speed mainline high-speed locomotives, 200km/h speed grade locomotives, high-speed detection trains, alpine sand-proof locomotives, intercity locomotives, double-decker locomotives, intelligent high-speed trains and other

spectrum of locomotives. AC drive passenger and freight locomotives, shunting locomotives, AC drive locomotives for high altitude, alpine, hybrid locomotives. New railway coaches. Large axle weight long grouping heavy freight trains, fast freight trains. All kinds of rolling stock and key equipment of the above-mentioned rolling stock.

2.4.2 Urban rail vehicles

Urban rail metro and light rail vehicles, urban rail vehicles, modern trams, energy storage urban rail vehicles, advanced monorail vehicles, low and medium speed magnetic levitation vehicles. Complete sets of key equipment for the above-mentioned types of vehicles.

2.4.3 Railway communication signal system

High-speed and intercity railway train operation control system, high-speed broadband vehicle-to-ground wireless communication system. Urban rail transit train operation control system, CBTC interconnected train operation control system, fully automatic operation system (FAO), LTE vehicle-to-ground wireless communication system. Signal control systems for modern trams and other forms of rail transit. Computer interlocking systems for rail transport, track circuits, transponders, axle counting equipment. Integrated and integrated automation system for freight formation stations. Rail transit turnout switching system, turnout snow melting system.

2.4.4 Railway construction machinery and components

Rail flaw detection, grinding, milling and grinding car, turnout grinding, ballast shaping car, efficient track cleaning, sieving car, efficient line tamping, stabilization car, comprehensive inspection car, railway mobile loading test car, bridge and tunnel state inspection and maintenance car, contact network multi-

functional maintenance work car. Complete sets of key equipment for the above-mentioned types of vehicles. Dual source system, plateau type and multi-functional combined engineering and road maintenance machinery and equipment. High-speed, heavy-duty and urban rail track rails and turnouts.

2.4.5 Special equipment, key systems and components for rail transportation

Railway dedicated traction power supply system, urban rail transit traction power supply system, energy-fed traction power supply system. Locomotive, locomotive and vehicle network control system, train network control system, traction control system. AC traction drive power converter for rail transportation, control system for low and medium speed magnetic levitation trains, hybrid locomotive control and electric energy management system, energy storage type urban rail vehicle power system, key components of the above systems. High-speed, intercity, and

Braking system for urban rail transit vehicles, braking system for passenger and freight locomotives, braking system for heavy and fast cargo trains, magnetic rail braking device, eddy current braking device, high reliability pneumatic components for braking system. Special gearboxes and drive units for rail transportation, key basic materials and components such as axles, wheels and bearings for high-speed rolling stock, vibration and noise reduction elastic wheels. Lightweight vehicle body. High-power medium-speed diesel engine, medium-power high-speed diesel engine, dual-fuel engine. Asynchronous traction motors for locomotives, locomotives and urban rail vehicles, permanent magnet traction motors, new light-weight transformers. On-board safety protection system, remote control, remote monitoring and telemetry system for traction power supply, natural disaster prevention and early warning system.

2.4.6 Critical equipment and systems for rail operations management

Rail transit dispatching command, dispatching centralized system, comprehensive monitoring system and

key equipment; rail transit emergency management system and key equipment; rail transit passenger information service system, automatic ticketing system, screen door system and key equipment; rail transit roadbed, bridge, tunnel, rail condition monitoring and early warning system and key equipment large doping, high value-added comprehensive utilization products.

2.5 Marine Engineering Equipment Industry

2.5.1 Offshore platform equipment

Physical exploration vessels, engineering survey vessels, large marine (polar) scientific research vessels, marine survey vessels, seabed resource survey vessels, hydrographic survey vessels, polar icebreakers, drop-tube rock throwers, jack-up drilling rigs, jack-up workover platforms, semi-submersible drilling rigs, semi-submersible production platforms, semi-submersible support platforms, drilling vessels, floating production storage and offloading units

(FPSO)、半潜运输船、起重铺管船、铺缆船、风车安装船、多用途工作船、平台供应船、大型起重船、潜水作业支持船、平台守护船、环保/救援船、ROV支持船、多功能动力定位船、液化天然气浮式生产储卸装置 (LNG-FPSO)、液化石油气浮式生产储卸装置 (LPG-FPSO)、deep draft column platform (SPAR)、tension leg platform (TLP)、floating drilling production storage and offloading device (FDPSO)、jack-up production storage and offloading oil platform, polymetallic nodules, gas hydrate and other deep-sea resources mining equipment, seawater lithium extraction and other marine chemical resources development equipment, etc. Subsea support maintenance vessel, saturation diving vessel, offshore support vessel, subsea pipeline inspection vessel, jack-up/semi-submersible life platform, semi-submersible well repair platform, economic deepwater drilling platform, polar zone (ice zone) drilling platform, floating liquefied natural gas production, storage and offloading unit (FLNG), floating liquefied natural gas storage and regasification unit (LNG-FSRU), deep-sea combustible ice exploration equipment, subsea Mineral mining platforms (ship), marine nuclear power platform, island floating

platform, deep-sea space station. Space resources development equipment such as maritime airports, maritime satellite launch sites, etc.

2.5.2 Marine engineering key ancillary equipment and systems

Jack-up platform lifting system, deep sea mooring system, power positioning system, FPSO single point mooring system, large offshore platform power station, large offshore power generation internal combustion engine/dual fuel gas turbine, natural gas compressor, gas power module, energy storage battery pack system module, automation control system, large offshore platform crane, underwater equipment installation and maintenance system, physical exploration equipment, well logging/recording/solidification systems and equipment, pipe-laying/cable-laying equipment

The company has developed a wide range of equipment and systems for drilling and repairing wells, large oil and gas processing and handling systems, safety protection and monitoring and testing systems, small and efficient oil and gas water separation equipment, semi-submersible drilling platform drilling column compensation systems and bulkhead compensation systems, rapid separation/recovery/emergency disposal equipment for seawater pollutants and waste, as well as other major supporting equipment, deep and distant ocean observation systems, submarine observation networks, offshore test sites, marine equipment Core supporting products and materials testing, testing and certification public service platform, etc. Drillship positioning winches, mud systems, drilling systems, well control systems, integrated information management systems for offshore vessels, natural gas pre-treatment and liquefaction systems, LNG regasification systems.

2.5.3 Marine Engineering Equipment Services

Marine engineering equipment research and development experiment (test) services, engineering

design and module design and manufacturing services, marine engineering equipment installation and commissioning services, maintenance services, marine engineering equipment technical consulting and trading services, intermediary agency services, information consulting services, marine engineering equipment investment consulting services, credit and financial services, insurance guarantee services, legal services, marine engineering risk evaluation, assessment and identification services, etc. .

2.5.4 Marine environmental monitoring and detection

equipment

Sensors, equipment and systems for marine hydrometeorological shore-based and offshore platform-based observation stations, marine hydrometeorological observation sensors, equipment and systems, hydrographic, meteorological and water quality observation buoys, submersible, seabed-based, mobile observation platforms (AUVs, ROVs, gliders, etc.), marine water quality and ecological elements measurement sensors and equipment, acoustic measurement and detection equipment, optical measurement and detection

equipment, high frequency ground wave radar, S/C/X-band
wave measurement mines

Auxiliary equipment such as da, water level and wave radar, marine type universal communication modules, marine hydrographic and geological survey winches, deep sea universal materials and connectors.

2.5.5 Marine energy-related systems and equipment

Marine energy generating sets. These include 10,000-kilowatt environment-friendly low head high-capacity tidal turbine generator sets, 300-kilowatt or more tidal wave generator sets, and 100-kilowatt new wave energy generator sets.

Marine energy-related systems and equipment. Including pre-development hydrographic observation, geological and topographic observation and survey equipment, offshore construction, transportation, installation and maintenance vessels and corresponding equipment, submarine cable-related equipment, submarine cable fault detection equipment, connectors, anti-adhesion and anti-corrosion materials.

Systems and equipment related to public support platforms for research and development of marine energy devices. This includes equipment required for the

construction and operation of public service platforms such as marine energy offshore test sites, marine energy comprehensive testing centres and marine power environment simulation tests.

2.5.6 Underwater systems and operational equipment

Underwater oil recovery trees, blowout preventers, subsea skidding production units, pumping equipment, emergency repair equipment for subsea facilities, emergency disaster mitigation and firefighting equipment, ROV/AUV and multifunctional subsea manipulators, manned deep submersibles, subsea pipeline welding equipment, drilling/production bulkheads, subsea manifolds, compressors, separators, booster pumps, subsea control systems, umbilical cable systems, subsea ore collection systems, etc.

2.5.7 Mariculture and marine biological resources utilization

equipment

High yield, full control, precision, standardization, modularization, high circulation rate of factory recirculating water aquaculture equipment, complete systems, complete systems for deep-sea net tank aquaculture resistant to typhoon of grade 12, special equipment for mariculture such as raft/bottom-seeded aquaculture, special culture systems, harvesting of cultured plants and animals, new marine aquatic products processing equipment and internet+intelligent service systems.

3 New Materials Industry

3.1 New Functional Materials Industry

3.1.1 New metal functional materials

Rare and precious metal materials such as metal hydrogen storage materials, cobalt-based amorphous soft magnetic alloy thin strip, nickel-based amorphous soft magnetic alloy thin strip, tungsten and molybdenum materials such as molybdenum alloy, molybdenum-copper alloy, molybdenum-titanium-zirconium alloy, etc.,

tantalum-niobium materials such as high specific capacity tantalum powder, high performance niobium alloy, scandium-niobium alloy materials, beryllium materials and beryllium products, etc.; titanium and titanium alloy powder materials, porous titanium and titanium alloy materials, titanium and its alloy rolling materials, etc.; Al-Ca alloy Al-Ca alloy, Al-In alloy, Al-V alloy, Al-Ca-In alloy, aluminum alloy die-casting material products, etc.; new metal fiber porous materials, ultra-fine high purity reactive zinc powder, cemented carbide materials, functional metal powder materials, etc.; foam metal materials such as copper foam, aluminum foam, nickel foam, etc.

3.1.2 New functional ceramic materials

Thermoelectric ceramic materials, piezoelectric ceramic materials, ferroelectric ceramic materials, dielectric ceramic materials, superconducting ceramic materials, high thermal conductivity ceramic materials, magnetoresistive ceramic materials, spintronic ceramic materials

Sub-ceramic materials, low temperature sintered complex phase ceramics, porous ceramic materials for high temperature filtration and purification.

3.1.3 Rare earth functional materials

High-performance rare-earth (permanent) magnetic materials and their products, rare-earth catalytic materials, rare-earth hydrogen storage materials, rare-earth optical functional materials, super magnetostrictive materials, rare-earth optical fibers, rare-earth laser crystals, rare-earth precision ceramic materials, high-performance rare-earth polishing materials, rare-earth magneto-optical storage materials, rare-earth magneto-cooling materials, as well as rare-earth nanomaterials, high-purity rare-earth compounds, rare-earth environmental pigments, etc.

3.1.4 High purity elements and compounds

High power graphite electrode, graphite for lithium ion battery anode, intermediate phase carbon microsphere, artificial diamond, etc., high purity germanium, high purity aluminum, high purity zinc, high purity tellurium, high purity selenium, high purity

cadmium, high purity mercury, high purity arsenic, high purity sulfur, high purity gallium arsenide, high purity gallium selenide, high purity cadmium telluride, lithium nickel cobaltate, lithium nickel manganate binary system, lithium nickel cobalt manganate, lithium nickel cobalt aluminate ternary system.

3.1.5 Surface functional materials

Functional coatings, new coating materials, environment-friendly anti-corrosion coatings, environment-friendly high-performance industrial coatings, high-temperature ceramic coating materials, high-grade automotive metallic pigments, water-based heavy-duty anti-corrosion coatings, high-temperature resistant alkali-resistant coatings, fire retardant coatings, magnetic heat-sensitive coating materials, self-cleaning coating materials, medical bioactive ceramic coatings.

3.1.6 High quality new organic active materials

High quality inorganic pigments, new organic/reducing/disperse dyes, high quality organic pigments, new inks, PCB-free phthalocyanine copper, fluorescent whitening series.

3.1.7 New membrane materials

Bio-functional and biomimetic separation membrane materials, proton membrane materials, ion exchange membranes, functional polymer membrane materials, homogeneous series of charge mat membranes, polyolefin microfiltration membranes, liquid degassing membranes, vapor-liquid phase separation membranes, membranes for in-membrane transfer, membrane materials for chlor-alkali, inorganic separation catalytic membrane materials, reverse osmosis membrane materials, ceramic separation membrane materials, osmotic gasification and vapor permeation separation membrane materials, composite and coated membranes for power batteries, and Other functional membrane materials.

3.1.8 Functional glass and new optical materials

Optical functional glass and fiber, electromagnetic

functional glass, heat-resistant functional glass, mechanical functional glass, special glass for aviation and vehicles, energy-saving glass, optical crystal materials, environmental functional (dimming, sound insulation, heat insulation, electromagnetic shielding, radiation protection) glass, etc.

3.1.9 Ecological and environmental materials

Biomaterials, environmentally degradable materials, environmentally friendly paints, environmental pollution control materials, materials for replacing restricted substances in electronic and electrical products, low-carbon and environmentally friendly packaging materials, ecological building materials. Green printing materials.

3.1.10 High quality synthetic rubber

Heat, corrosion and abrasion resistant functional rubber, special rubber materials, fluorine rubber, silicone rubber, thermoplastic elastomer, new trans-butadiene copolymer rubber and other rubber materials.

3.1.11 High performance sealing materials

High efficiency sealant, sealant and tape, car and middle and high grade light vehicle coverings, structural parts and power transmission, vibration damping, braking system with sealing materials, large sets of equipment, high pressure, hydraulic, pneumatic system with seals, electric power equipment, high temperature, high pressure mechanical seals, high-speed turbine compressor with non-contact gas membrane seals for petrochemical industry, metal magnetic fluid materials and seals, high-performance non-asbestos sealing materials High performance carbon graphite sealing materials, high performance non-pressure sintered silicon carbide materials, self-lubricating sealing materials, aerospace polysulfide sealant materials.

3.1.12 New catalytic materials and additives

Solid acid catalysts, solid base catalysts, biological catalysts, new petrochemical catalysts, catalysts for chemical, pharmaceutical and environmental protection, new coal chemical catalysts, high

temperature fuel cell catalysts, new photocatalytic materials and other additives.

3.1.13 New chemical fibers and functional textile materials

Anti-bacteria and anti-bacteria fiber materials, anti-static textile materials, flame retardant fiber materials, anti-melt drip fiber materials, phase change energy storage fiber materials, conductive fiber materials, anti-radiation textile materials, anti-UV functional fiber materials, chemical resistant fiber materials, lightweight fiber materials, geotechnical fiber materials, medical and health fiber materials, environmental protection filter cloth materials, anti-puncture and anti-cut fabrics, etc.

3.1.14 Other functional materials

Metamaterials, graphene materials, 3D printing base materials, etc.

Marine biological materials such as medical tissue engineering materials, new functional textile materials, pharmaceutical excipients, bio-fiber materials, bio-separation materials, bio-environmental materials, bio-corrosion materials, etc., which are sourced from marine organisms.

3.2 Advanced Structural Materials Industry

3.2.1 High-quality special steel materials

Special steel profiles and forgings for nuclear power, ultra-supercritical thermal power, high performance automotive, high speed railway, high quality stainless steel, high performance industrial mould steel, corrosion and high temperature resistant, high pressure high strength steel, high performance engineering steel, etc.; iron based high temperature alloy castings, special steel castings, high strength low temperature and ultra-low temperature weldable castings, etc., special varieties of high grade seamless tubes, etc. High-speed steel, die steel, high-speed steel thin wrench, die steel thin wrench, titanium and titanium alloy thin wrench, bimetallic structural materials, magnesium and

magnesium alloy thin wrench; high-speed steel flat wire, titanium and titanium alloy wire.

3.2.2 High performance non-ferrous metals and alloy materials

High-precision copper and tube, bar, wire profile products, copper-nickel, copper-titanium, beryllium copper and other copper alloy tube, bar, wire profile, high-strength, high-conductivity copper, electrolytic copper foil, calendered copper foil, electronic copper, copper alloy lead frame, high-performance plug components and other electronic products, other high-performance copper and copper alloy calendering products. High-performance aluminum and aluminum alloy wires, rods, strips, tubes, plates, profiles and other products, capacitor aluminum foil, hydrophilic, extra-thin aluminum and aluminum alloy foil, aluminum and aluminum alloy processed by semi-consolidation casting, high-strength aluminum alloy forgings. High-performance titanium and titanium alloy wires, rods, strips, tubes, plates, profiles, etc., titanium and titanium alloy moulds

Forgings, rotary forgings, castings and forgings, medical titanium alloy materials (hip joints, bone nails, bone plates), medical titanium alloy devices, large-size special titanium alloy forgings. Pure nickel, nickel alloy wire, wire, rod, tube, strip, plate and other profiles, printed nickel mesh, nickel-based alloy, cobalt-based alloy castings. High performance magnesium alloy and deformed magnesium alloy, magnesium alloy corrosion control and protection, magnesium alloy forgings.

3.2.3 New structural ceramic materials

Transparent alumina materials, high purity zirconia materials, new superhard materials (silicon nitride, boron nitride, boron carbide), ceramic fiber composites, zirconia toughened ceramics, artificial gemstones.

3.2.4 Engineering Plastics and Synthetic Resins

New engineering plastics and plastic alloys, new special engineering plastics, new fluoroplastics, liquid crystal polymers, high performance thermoplastic resins, flame retardant modified plastics, ABS and its modified products, HIPS and its modified materials, unsaturated polyester resin special materials, automotive

lightweight thermoplastic composites. New polyurethane materials. High performance epoxy resin, polybismaleimide resin, polyimide resin, polyisocyanate resin, phenolic resin.

3.3 High Performance Composites Industry

3.3.1 High Performance Fibers and Composites

High-performance carbon fibers and their composites, carbon/carbon composites, high-strength glass fibers, continuous basalt fibers, ceramic fibers, graphite fibers and other inorganic non-metallic high-performance fibers and their composites, aramid, ultra-high molecular weight polyethylene fibers and their composites.

Aramid fiber, polyphenylene sulfide fiber, polytetrafluoroethylene fiber, polyimide fiber, phenolic fiber, high water absorption fiber and other new fibers with corrosion resistance, high temperature resistance, high strength and high modulus, flame resistance, conductivity and other functions. High-performance resin composite materials with high efficiency and low cost, automated molding. Structural/functional integrated composites with wave-transparent, wave-absorbing, electromagnetic shielding, stealth and other functions, intelligent composites with self-detection, self-diagnosis, self-healing, self-adaptation and other functions, flame retardant functional composites, armor functional composites, thermal protection functional composites, gradient functional composites.

3.3.2 Metal matrix composites and ceramic matrix composites

Aluminum matrix composites reinforced with silicon carbide, boron carbide, titanium boride, silicon nitride fibers, whiskers, particles, etc., copper matrix composites, titanium matrix ceramic composites for high

temperature, high pressure, high speed and corrosive media service environments, magnesium matrix ceramic composites, aluminum matrix ceramic composites, titanium matrix composites, magnesium matrix composites, nickel matrix composites, beryllium matrix composites, refractory metal matrix composites, high temperature alloy matrix composites, intermetallic compound matrix composites. High temperature structural ceramic matrix composites such as silicon nitride and silicon carbide reinforced with continuous silicon carbide and other fibers, whiskers and particles.

3.3.3 Other high performance composites

Soft magnetic composites, green composites for rail transportation, melt-spun spandex materials, etc.

4 bio-industry

4.1 biomedical industry

4.1.1 New vaccines

Vaccines for major or emerging infectious diseases such as hepatitis, malaria, tuberculosis, AIDS, hand, foot and mouth disease, new types of vaccines such as genetically engineered vaccines and nucleic acid vaccines. Vaccines for zoonotic diseases and therapeutic vaccines against tumors, autoimmune diseases and chronic infectious diseases. Upgraded and combined vaccines for traditional basic immunization such as influenza pertussis (cell-free), chickenpox, measles, hepatitis A, polio, etc. New dosage forms of oral vaccines, inhalation vaccines.

Large-scale culture of vaccine antigens, vaccine antigen purification technology, new process technology for protein purification production, vaccine safety and immunity related technology, freeze-dried vaccine heat protection technology and rapid vaccine quality evaluation technology and methods, etc.

4.1.2 Biotech drugs

Antibody drugs for the treatment of malignant tumors, autoimmune diseases, neurological diseases and other refractory diseases, as well as for emergency prevention and treatment of infectious diseases, genetically engineered protein drugs with low immunogenicity, good stability, strong targeting, long-lasting effects and high bioavailability. Cell therapy products and gene therapy drugs for difficult-to-treat diseases such as malignant tumors. Products such as specific immunoglobulins. Blood products that facilitate improved plasma utilization.

The large-scale preparation and production technology of genetic engineering drugs, antibody drugs, nucleic acid drugs, stable expression cell line construction technology, protein engineering technology, chemical modification technology, long-acting, slow-release, controlled-release and other biological preparation technology, new vectors, adjuvants, stabilizers and protectors for vaccines, cell therapy-related technology.

4.1.3 Manufacture of chemicals and APIs

Novel anti-infective drugs against viruses, drug-resistant bacteria, deep and multiple fungi, drug-resistant *Mycobacterium tuberculosis*, other microorganisms (such as chlamydia, mycoplasma, malaria, parasites, etc.), targeted and highly selective anti-tumor drugs with low toxic side effects and high clinical efficacy for the treatment of lung cancer, liver cancer and other tumor diseases with high prevalence in China, prevention and treatment of cardiovascular diseases such as hypertension and endocrine and metabolic diseases such as diabetes Novel

single and compound drugs with novel mechanism, long-acting and fast-acting effects and convenient administration, novel immunomodulators for the treatment of rheumatoid arthritis, systemic lupus erythematosus, psoriasis, gout, immune deficiency and other diseases as well as transplant rejection reactions. Novel fast-acting drugs to relieve symptoms and novel long-acting drugs to relieve conditions for psychiatric diseases such as depression, anxiety, insomnia and schizophrenia, neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease, and chronic neuropathic pain. New drugs for the treatment of children's diseases and "orphan diseases".

Separation and purification, chiral synthesis and disassembly, biocatalytic synthesis, crystalline preparation, online quality control for drug production, drug information and other technologies for drug production; new dosage form process technologies for formulation production such as slow release, controlled release, long-acting formulations, immediate-release formulations, targeted drug release, transdermal and mucosal drug delivery formulations.

4.1.4 Modern Chinese Medicine and Ethnic Medicine

Research on the development of new TCM drugs and TCM health products focusing on the clinical treatment advantages of TCM for major diseases. New TCM drugs with precise efficacy, high safety, clear effective components, clear mechanism of action and advanced preparation process. Large varieties of secondary-developed proprietary Chinese medicines with definite efficacy and high market share.

Secondary development of ethnic medicines with significant therapeutic effects, new varieties developed for new uses and new technologies for ethnic and local traditional medicines, new varieties of animal medicines with ethnic characteristics developed from insect animals.

Extraction and refinement of Chinese medicine, Chinese medicine preparation, Chinese herbal medicine cultivation, processing technology and equipment for the preparation of Chinese herbal medicine, research on the safety limits of pesticide residues, heavy metals and harmful elements of Chinese herbal medicine, research on

quality control standards of Chinese medicine, etc., as well as extraction and refinement and quality control special technology of insect-animal medicine with important economic value.

Chinese medicine green manufacturing, intelligent manufacturing technology system and equipment development research. Chinese medicine beverage tablet concoction processing technology, Chinese medicine quality control technology and equipment, etc.

4.1.5 Biopharmaceutical key equipment and raw materials

Clean animals (including embryos), cell lines, culture media for vaccine and drug production, high-precision, automated, programmed, continuous and efficient equipment and media for genetic engineering, cell engineering, fermentation engineering, production of natural drugs, separation of active ingredients of drugs, etc., as well as production equipment suitable for biological product plants, etc. New excipients for solid formulations, new coating materials, new excipients for injection, premixed excipients for pharmaceutical formulations.

4.1.6 Biomedical Services

Contract Research (CRO) for pre-clinical research and clinical trials aimed at obtaining marketing approval for different types of innovative products such as chemical drugs, biologics, Chinese medicine and medical devices. Contract manufacturing of different sizes of raw materials, excipients and formulations (CMO). Collection, preservation and exploitation of biological resources (including human, animal, plant and microbial resources) and other special sample libraries (compound libraries, cell libraries, antibody libraries and other biological component libraries). Establishment, maintenance and exploitation of biological information systems (genomic information, proteomic information, systems biology information, etc.) and databases, and sharing platforms for biological big data and medical and health care big data. Professional technical services in gene sequencing, drug screening, experimental animal models, and large-scale transgenesis of animals and plants. Supply, maintenance, testing and monitoring services for

laboratory instruments and equipment, reagents. Design, construction, maintenance, approval and monitoring services for biosafety laboratories and GMP production workshops. Genetic testing services for personalized health protection and precision medicine, online and offline combination of intelligent diagnosis and treatment ecosystem, biological treatment services for major and difficult diseases, community and family remote health management services based on Internet of Things and other technologies.

4.2 Biomedical Engineering Industry

4.2.1 Medical imaging equipment and services

Medical imaging equipment. Includes multi-energy multi-row spiral computed tomography (CT), permanent magnetic resonance or high field strength superconducting magnetic resonance imaging (MRI), magnetoencephalography (MEG) and functional near-infrared spectroscopy (fNIRS), positron emission tomography (PET),

High-performance ultrasound imaging (USI) and its integrated multimodal hybrid imaging equipment; high-performance electronic endoscopy/lumenscopy (ES) (such as gastroscopy, laryngoscopy, bronchoscopy, laparoscopy, arthroscopy, etc.) and its ultrasound, optical coherence, fluorescence, confocal and other composite modality imaging systems; high-performance digital radiography (DR), digital angiography (DSA), and gastrointestinal, breast, bladder, oral, etc. Specialized digital radiography; handheld, portable, movable, vehicle-mounted and other multifunctional medical imaging systems and their supporting equipment.

The core components include high field superconducting magnets, superconducting RF array surface coils, cryocoolers for MRI, high heat capacity X-ray bulbs, fast multi-row CT detectors, amorphous silicon/oxide flat panel X-ray detectors, magnetically compatible all-digital solid state PET detectors, high density surface array ultrasound probes, low dose detectors, and other core components and their key technologies.

Medical imaging services. Includes ancillary equipment and technology related to services such as remote image diagnosis, mobile image diagnosis and treatment, and third-party medical imaging centres.

4.2.2 Advanced Treatment Facilities and Services

Oncology treatment equipment. Including radiation therapy systems of electron linear accelerators, proton/heavy ion cyclotrons and their high-precision treatment planning systems with advanced functions such as real-time motion tracking, image guidance, conformal and intensity adjustment; tumor thermal therapy, ablation and cold therapy equipment such as magnetic induction, high-intensity focused ultrasound (HIFU), radio frequency, microwave and argon helium knife and their treatment monitoring systems; boron neutron capture therapy systems and their targeting drugs .

Surgical treatment equipment. Including intraoperative positioning, intraoperative imaging, intraoperative monitoring, image navigation and other equipment and their information systems; digital, integrated surgical and interventional treatment

Hybrid operating room equipment and its information system for treatment, intraoperative treatment, minimally invasive treatment, etc.; surgical assistance robots for abdominal, thoracic, urological, orthopedic, interventional, etc. and their supporting minimally invasive surgical instruments; high-performance laser, ultrasonic, plasma, high-frequency and other new surgical instruments, digital anesthesia machine workstations with functions such as anesthesia depth monitoring and control.

Rehabilitation therapy equipment. Including implantable neurostimulators, multi-chamber pacemakers, implantable defibrillators, cochlear implants; acoustic and photodynamic therapy and their sensitizers; rehabilitation physiotherapy equipment such as ultra-fast electromagnetic pulse, ultra-high electrostatic field, high-power laser, electromagnetic field, electromagnetic wave, ultrasound, optics, mechanics, etc.; rehabilitation training and treatment robots with real-time three-dimensional muscle strength assessment, gait analysis, balance assessment control, limb linkage, functional electrical stimulation (FES) , biofeedback,

motor monitoring, sensory testing and other functions of rehabilitation training and treatment robots; rehabilitation training and assessment systems for muscle function training, behavioral, psychological and cognitive interventions.

Specialized treatment equipment. Including ophthalmic excimer laser therapy, urological laser therapy, endoscopic laser therapy, oral therapy equipment; image fusion-based cardiac conduction three-dimensional marker measurement and radiofrequency ablation therapy system; traditional medicine based on the principles of Chinese medicine treatment equipment.

Life support equipment. Includes high-performance ventilators with new ventilation modes, artificial heart-lung machines, extracorporeal membrane lung oxygenation systems, cardiac function assist devices; continuous blood purification systems, haemodialysis machines, peritoneal dialysis machines, artificial liver therapy devices, haemoperfusion, plasma adsorption and plasma replacement equipment and consumables; intensive care systems, automatic defibrillators, cardiopulmonary resuscitation devices.

Rehabilitation therapy services. This includes ancillary equipment and technology related to services such as third-party radiation oncology treatment centres, community blood purification centres, community chronic disease treatment centres, community rehabilitation physiotherapy centres and community rehabilitation training centres.

4.2.3 Medical examination and testing instruments and services

Medical examination and testing instruments. These include electrocardiography, electroencephalography, electromyography, evoked potentials, electromyography of the eye and other electrophysiological signal detection analyzers, new vascular function, cardiac function, pulmonary function and cardiopulmonary function test analyzers, continuous dynamic electrocardiography, electroencephalography, blood pressure, blood glucose, hemoglobin and other test analyzers, low physiological and low psychological load respiratory sleep monitoring analyzers, multifunctional multi-parameter physiological parameter monitors; Doppler blood flow imager,

ultrasound bone density 检测分析仪、眼科光相干层析成像（OCT）等专科诊断设备； 无创/微创颅内压监测仪、无创/微创血糖测试仪、无创活体生化分析装置；基于物联网、可穿戴、传感网络、移动通信、全球定位等技术的健康信息终端、全科检查装置、生命信息监测装置及其相关的信息系统和云平台；肺癌、 Stomach cancer, liver cancer, bowel cancer, breast cancer, cervical cancer and other major chronic diseases screening and diagnostic devices.

In vitro diagnostic testing instruments. Including high-precision, high-throughput (rapid), fully automatic biochemical, electrolyte, blood gas, urine, body fluid, stool, vaginal secretion, hemoglobin, glycated hemoglobin, specific protein, blood cells, microorganisms, metabolism, nutrition, blood coagulation and other testing and analysis instruments (including dry) and their disease diagnosis and screening information systems; fully automatic, high-throughput, high-sensitivity enzyme-linked photometric, electrochemical, chemiluminescent, electro

Immunoassay systems for chemiluminescence, fluorescence, time-resolved fluorescence, homogeneous time-resolved fluorescence and other methods, instruments related to tissue/cell detection and analysis, automated immunohistochemistry stainers and their supporting reagents; medical mass spectrometry analyzers, medical chromatography analyzers, microspectrophotometers, automated blood typers, flow cytometric analyzers, confocal scanners, on-site rapid multiparameter biochemical detectors (POCT, microbiological culture instrument; mercury-free thermometer, all kinds of in vitro diagnostic reagents, test paper and its supporting equipment and consumables.

Molecular diagnostic testing instruments. Including real-time fluorescence quantitative PCR instrument, fluorescence in situ hybridization instrument, high-throughput gene sequencer, real-time detection system of thermostatic chip nucleic acid, biochip reader, biochip hybridizer, biochip wash and dry instrument, super-resolution molecular microscopic imaging system, rapid automatic nucleic acid extractor; molecular bioinformatics

analysis and processing system.

Medical screening and testing services. Includes ancillary equipment and technology related to services such as third-party in vitro diagnostic centres, health screening centres, health records and information collection centres, molecular diagnostic information centres, health huts, etc.

4.2.4 Implantable Biomedical Materials and Services

Biomedical implant interventional bodies. Including medical catheters and guidewires such as angiography/central vein/balloon dilation, drug-eluting and biodegradable cardiovascular stents, cerebrovascular stents, aortic stents; precordial blockers, mechanical/biological artificial heart valves, artificial blood vessels such as polyester/expanded PTFE/biotype/bioceramic, artificial joint prostheses such as hip/knee/shoulder, osteoinductive artificial bone, soft/hard artificial lens, artificial cornea/ amniotic membrane and other eye

Surgical implants, polyester/carbon fiber/biological and other artificial ligaments; new biomedical implant interventions based on tissue engineering, bioprinting and 3D printing.

Biomedical materials. These include collagen-based/poly lactide-based/tantalum-based bone repair materials, active calcium silicate/calcium phosphate composite bone cement, artificial bone/metal bone fixation materials, bone implant materials such as artificial intervertebral discs, dental implants/periodontal tissue-guided collagen membranes/dental implants such as collagen hemostatic sponges, insect-animal-derived biocompatible skin repair and aesthetic controlled slow-release pharmaceutical biofilms Materials, cerebrovascular/ alpha-cyanoacrylate liquid vascular/ polyvinyl alcohol embolic agents, artificial blood such as recombinant hemoglobin oxygen carrier/ liposome-encapsulated hemoglobin oxygen carrier/ polymerized hemoglobin oxygen carrier, dural repair materials such as bovine Achilles tendon type I collagen membrane/ porcine-derived pericardium/ bovine

pericardium/ expanded polytetrafluoroethylene, central nerve repair materials, hyaluronic acid and Soft tissue filling materials such as hyaluronic acid and collagen, cellular tissue-inducing biomaterials, and bioactive dressings such as chitosan-based/sodium alginate with hemostatic/anti-inflammatory/repair functions.

Biomedical materials services. Includes personalized medical implant manufacturing service centers and their associated ancillary equipment and technology.

4.3 Bio-agricultural industry

4.3.1 bio-breeding

The main technologies involved in biological breeding, including the discovery, isolation and cloning of functionally important genes in agricultural organisms, molecular marker-assisted breeding technology, genetic engineering (transgenic

(genetic) breeding technology, molecular design breeding technology, plant detoxification tissue culture fast breeding technology, cell engineering breeding technology, animal embryo engineering technology, animal cloning technology, animal and plant bioreactor technology, chromosome manipulation technology, plant haploid, diploid and polyploid induction breeding technology, germplasm resource irradiation mutagenesis breeding technology, aerospace breeding technology, as well as genome editing technology, big data analysis Optimization of breeding management technology, etc. Key products based on the above technology systems. including high quality, high yield, disease resistance New varieties and new combinations of grain, cotton and oil crops such as insects, drought and salt resistance, new varieties and seedlings of fruits, vegetables and flowers, new varieties and seedlings of special economic crops, forestry green trees and garden plants, new varieties and seedlings of energy plants, new varieties of forage, new varieties of excellent livestock and poultry, sperm and embryos of breeding animals and good animals,

bioreactors and products of animals and plants, new varieties and large-scale healthy aquaculture, new biological breeding materials, new species of animals and plants with important economic and medicinal values and artificial large-scale breeding, etc.

4.3.2 biological pesticide

Biopesticides. Including bacterial, fungal and viral living microorganisms, microbial metabolites processing preparations, plant-derived pesticides, etc., with modern microbial technology, recombinant DNA technology, fermentation engineering, etc. as technical support, including large-scale isolation and identification of microorganisms and resource utilization technology, functional gene isolation, cloning, expression and recombination technology of plants, animals and microorganisms, gene transfer and biological microcapsules technology, antibiotic combination biosynthesis 技术, 植物源农药规模化生产技术, 寡糖分子结构化学修饰与改造技术, 新型广谱长效生物农药剂型加工工艺与生产技术等。

Key products. These include safe, efficient, new microbial insecticides such as *Bacillus thuringiensis* (BT), *C. albicans*, *C. aeruginosa*, and insect viruses, microbial metabolite preparations such as agricultural antibiotics, bacteriophage preparations for disease control, microecological and oligosaccharide preparations, biochemical preparations such as insect pheromones, and plant-derived insecticides and bacteriostatic fungicides.

4.3.3 biofertilizer

Key products and technical services. Including microbial fertilizer producing bacteria screening and fermentation process, new technology of symbiotic nitrogen fixing microbial application, agricultural biogas production and comprehensive utilization, crop straw return technology, biofertilizer slow release technology and equipment, microbial degradation technology of artificial organic matter and hazardous waste, rhizobia and other symbiotic nitrogen fixing microbial agents, organic material decomposer, bio-organic fertilizer, compound microbial fertilizer

products, etc.

4.3.4 biofeed

Key products and technical services. These include gene isolation and modification, enzyme engineering and fermentation engineering technology, β -1,4 xylanase, β -mannanase, β -1,3-1,4 glucanase, α -galactosidase, amino acids and other series of feed enzymes and additives, new feed proteins and high temperature, acid and pepsin resistant hydrolysis feed enzymes, yeast-derived bio-feeds, high activity bio-fermented feeds, micro-ecological preparations Antibody-free full-price bio-feeds, bioactive peptides and antibacterial peptides, oligosaccharides and bio-pigments for feed, special feeds for young animals, plant extract additives, probiotic additives, bio-drug feed additives, high-efficiency aquaculture feed formulation technology and animal feed source alternative products, etc.

4.3.5 Biological veterinary drugs, veterinary biological

products and vaccines

Key products and technical services. These include genetically engineered bacteria preferential selection and downstream purification technology, new vaccines for the prevention of major animal diseases such as avian influenza, foot-and-mouth disease, swine blue ear disease and zoonotic diseases such as rabies and brucellosis, including genetically engineered vaccines such as subunit vaccines, marker vaccines, gene deletion vaccines, live vector vaccines and transgenic plant vaccines, mucosal immune vaccines, new adjuvant vaccines, dry powder vaccines, multiplex polyvalent vaccines, etc. New types of biological veterinary drugs, veterinary Chinese medicine and related medical equipment for common and multiple animal diseases. Early warning and monitoring technology for mariculture diseases, preventive vaccines for major aquatic animal diseases. Molecular diagnosis and detection kits for major animal diseases and multi-infestation animal diseases.

4.3.6 bio-food

Key products and technical services. Including food biomimetics technology, targeted separation and extraction technology of bioactive factors, food synthetic bioengineering technology, food bioefficient transformation technology, gut microbial macrogenomics technology, molecular food, precision nutrition food, etc.

4.4 Biomanufacturing industry

4.4.1 bio-based material

Bioplastics, biofibers, bio-rubber and other polymers based on biomass sources. These include polylactic acid (PLA), polyhydroxyalkanoic acid (PHA), poly(propylene terephthalate) (PTT), polybutylene succinate (PBS), polyamino acids, polytetrahydrofuran, polyorganic acid composites and products, polyol fibers, starch-based plastics,

Bio-based polyester, bio-based polyurethane, biomass fiber, new carbon adsorbent material, chitosan fiber, algae fiber, glucomannan material, protein fiber, non-staple food denatured starch-based biodegradable material, microbial polysaccharide material, bio-based material additives, etc. Biobased materials polymerization technology, high density and high viscosity microbial fermentation process technology, the Aqueous phase separation technology of biopolymers, efficient separation and extraction technology of biopolymers and other materials, bio-composites and their molding, processing and modification technology, biomass fiber bio-degumming technology, clean production technology of bio-based materials.

4.4.2 Biochemicals

Bulk and fine chemicals and their derivatives prepared biologically or from biomass feedstocks. Including bioethylene, isoprene, acrylic acid, ethanol, ethylene glycol, propylene glycol, isopropanol, 3-hydroxypropionic acid, acrylic acid, butanol, isobutanol, butanediol, butanetriol, polyols, acetic

acid, lactic acid, propionic acid, butyric acid, butanedioic acid, glyoxylic acid, fumaric acid, long chain dibasic acids, long chain fatty acids, malic acid, itaconic acid, citric acid, citrate, isosorbide, chiral compounds, steroid compounds , chemical intermediates, additives, straw sugar, oligosaccharides, rare sugars, unnatural amino acids, etc.

Non-food feedstock conversion technology, biorefinery technology, biomass gasification technology, chemical product fermentation technology, biocatalysis technology, whole-cell catalytic conversion technology, biopartitioning technology, bioenzymatic technology, biochemical combination synthesis technology, biosynthesis process control technology, etc.

4.4.3 Special fermentation products and bioprocess

equipment

Industrial enzyme preparation. Including enzymes for textile, paper, washing, tanning, chemical, energy, food, etc. Special and specialized enzyme preparations such as enzymes for clinical diagnosis and dietary supplements. New fermentation products such as amino acids, vitamins, microbial agents, biological pigments, biological preservatives, biological flocculants, microbial polysaccharides, biological oils and fats, phytochemicals, sugar alcohols, nucleosides, functional peptides, pyruvic acid, etc. Biological process equipment such as automatic fermenters and automatic control systems, special cell culture reactors, bioprocessing reactors, biosensors, special separation equipment for biomacromolecular products, etc.

Fermentation process optimization technology and equipment. Including high density fermentation, solid fermentation, gas fermentation, clean fermentation, enzyme evaluation, bio-printing, bio-bleaching, bio-tanning, bio-degumming, bio-prospecting, bio-metallurgy, membrane

separation, supercritical fluid leaching, high throughput screening, bio-processing, bio-extraction, bio-separation and other technologies and equipment.

4.4.4 Marine bioactive substances and biological products

Based on modern biotechnology, marine functional foods and biological products are obtained from marine organisms. These include natural carotenoids such as astaxanthin, lutein, phycocyanin and other natural pigments, polyunsaturated fatty acids such as docosahexaenoic acid and eicosapentaenoic acid, new marine enzymes such as proteases, lipases and cellulases, feed additives such as marine functional proteins, peptides and oligosaccharides, marine biological fertilizers, marine biological pesticides, marine biological regulators and algaecides, etc., and marine microbial vaccines. Extraction, purification and synthesis technology of marine bioactive substances, green preparation technology of chitinous oligosaccharides and their derivatives, macroalgae

Culture and refining, seaweed energy technology development, marine medicinal biological resources and active product discovery and utilization technology, marine agricultural biological drug creation high technology, marine animal and plant biological large-scale culture and reactor technology, marine agricultural biological drug efficient expression and product purification technology.

4.5 Biomass industry

4.5.1 Raw material supply system

Building a dynamic biomass energy resource database information system platform. It organically combines biomass energy resource data information with meteorological information, land development and utilization information, water and soil resource protection information, as well as agricultural and forestry production planning information and other types of information data to form a perfect biomass energy resource evaluation system.

Highly efficient crop straw and forestry residue resources collection, shredding machinery and transport equipment. Urban sludge deodorization collection and

transportation equipment.

Screening and improvement of superior energy tree and grass species. Construction of a large-scale energy crop raw material supply base and the development of a management system and standards to go with it.

4.5.2 Biomass power generation

Biomass mixed combustion metering and monitoring equipment; waste-to-energy boiler flue gas pollutant emission online monitoring device.

Using biomass resources such as agricultural and forestry residues, livestock manure, urban household waste, industrial organic waste liquids (including paper black liquor, printing and dyeing waste liquor, brewing waste liquor, leather waste liquor, etc.), sewage sludge and other biomass resources as the main raw materials, and flexibly configuring them for power generation, heating and

High-efficiency, environmentally friendly distributed energy stations for refrigeration, gas supply, and other forms of energy products. Distributed multi-generator material generation system. Applicable to internal combustion generator sets and small gas turbine generator sets of different gases, with a single power range of 300–2000 kW and a power generation efficiency of not less than 35%.

4.5.3 Biomass for heat

A distributed biomass heating system with high efficiency, high stability, no standby and other performance biomass heating boiler as the core of the complete set of equipment, including high-efficiency heat accumulator, automatic control, remote monitoring, multi-heat source intelligent heat network, etc.

4.5.4 Biogas

The fermentation process, purification technology and complete sets of equipment with high volumetric gas yield for different biomass raw materials such as agricultural and forestry residues, livestock manure, urban domestic waste, industrial organic wastewater

waste liquid, etc.

4.5.5 Biomass liquid fuels

Process technology and equipment for cellulosic ethanol production. Mainly high efficiency, low consumption, high yield of raw material cellulose separation technology process and equipment, low cost glycolytic enzymes.

F-T synthetic biomass liquid fuel production process and equipment. High efficiency biomass gasification and purification process and equipment, high efficiency and low cost catalysts and complete production process and complete sets of equipment developed on the basis of this research.

Biomass direct liquefaction technology and complete sets of equipment. Biomass fast cracking process technology and equipment with high liquid phase yield and low energy consumption, deacidification, esterification and reforming process technology and equipment suitable for bio-liquid fuel production scale.

4.5.6 Biomass technology services

Biomass product testing and certification services, biomass energy resource assessment services, biomass energy development and application design and construction services, biomass energy project acceptance and post-evaluation services, biomass energy project maintenance and optimization services, biomass energy project due diligence and risk assessment services.

5 New Energy Vehicle Industry

5.1 New Energy Vehicle Products

5.1.1 New Energy Vehicle Complete Vehicle

Pure electric passenger vehicles, plug-in hybrid passenger vehicles (including add-on); pure electric

commercial vehicles, plug-in commercial vehicles (including add-on); fuel cell passenger vehicles, fuel cell commercial vehicles; pure electric special vehicles and other complete vehicles.

5.1.2 Motors and their control systems

High-efficiency motors for drive or power generation, hub motors, wheelside motors; motor controllers and control software for drive or power generation; controllers with integrated DC-DC and other electrical functions; variable voltage controllers.

5.1.3 Electric accessories for new energy vehicles

High reliability high voltage relay, high voltage fuse, high voltage cable, high voltage plug, insulation detector, electric brake vacuum pump, electric air compressor, electric power steering system, electric air conditioning and thermal management system (including heat pump air conditioning, electric compressor, CO₂ electric compressor, battery cooler, air conditioning box and cooling module, etc.), DC/DC converter, vehicle charger, vehicle AC/DC charging interface, etc. .

5.1.4 Plug-in hybrid-specific engines

Atkinson cycle engines, special engines for range extenders; special engine electronic control units, etc.

5.1.5 Electromechanical coupling system and energy

recovery system

Electromechanical coupling systems for pure electric and plug-in hybrid passenger cars and commercial vehicles, two- and multi-speed automatic transmission systems and their electronically controlled automatic actuators, planetary gears for power splitting, high-performance automatic clutches and brakes and their

actuators, electromechanical distributed recovery braking systems for new energy passenger cars and commercial vehicles.

5.1.6 Fuel cell systems and core components

Fuel cell stack, module and system, compressor system, compressor motor and compressor pump, fuel cell related materials including MEA, bipolar plate, carbon fiber paper, proton exchange membrane, platinum catalyst and other new catalysts, etc.; fuel cell system related auxiliary parts including high power DC/DC, hydrogen injector, circulation pump, compressor, back pressure valve, water separator, thermostat, radiator, regulator, humidifier The fuel cell system related auxiliary parts include high power DC/DC, hydrogen injector, circulation pump, air compressor, back pressure valve, water separator, thermostat, radiator, regulator, humidifier, water separator, cooling pump, hydrogen

Pressure sensor, flow sensor, hydrogen concentration sensor, etc.; On-board hydrogen storage system includes plastic liner of hydrogen storage bottle, high strength carbon fiber, high performance hydrogen storage alloy and metal hydride, high pressure valve and interface, etc.

5.2 Charging, switching and hydrogen refuelling facilities

5.2.1 Distributed AC Charging Post

Ground AC charging pile, underground AC charging pile; core components such as pile body, electrical module, communication module, metering module for distributed AC charging pile.

5.2.2 Centralized fast charging stations

Centralized fast charging stations and core equipment such as chargers, power supply systems, communication systems, energy management systems, security systems and information processing systems for centralized fast charging stations.

5.2.3 electricity exchange facility

Battery replacement robot; field station type efficient and reliable charging and changing integrated system equipment; passenger car chassis changing key

changing equipment, automatic unlocking mechanism, field control system and operation management system.

5.2.4 Station hydrogen refuelling and storage facilities

Hydrogen manufacturing equipment, high pressure hydrogen storage tanks for stations, high pressure hydrogen transport vehicles, high pressure hydrogen refilling equipment.

5.3 Production test equipment

5.3.1 Battery production equipment

Automatic powder supply system, vacuum mixing system and slurry supply system, high speed extrusion type cell coating equipment, cell roller pressing equipment, cell high speed slitting equipment, cell forming, lug welding, winding and stacking single machine automation and line automation production line equipment, liquid injection, packaging and other single machine automation and line automation production line equipment, battery production online monitoring equipment, battery module automatic stacking equipment, module welding equipment and off-line testing equipment, battery energy-saving equipment, battery aging and sorting equipment, battery recycling production equipment; fuel cell MEA, bipolar plate preparation equipment, fuel cell stack test platform.

5.3.2 Motor production equipment

Motor mass production intelligent manufacturing system and key process equipment, motor stator and rotor punching and stacking - welding equipment, motor

automatic winding equipment, stator off-line and dipping paint sets of equipment, permanent magnet assembly and injection molding fixed, rotor magnetization and automatic balancing equipment, stator and rotor testing equipment, motor controller circuit board manufacturing and cooling plate processing equipment, motor controller manufacturing inspection system, light alloy motor shell casting or welding equipment, non-destructive testing equipment; motor off-line testing equipment.

5.3.3 Specialized production equipment

Special sub-assembly and off-line testing equipment for electromechanical coupling system, power cell system, high-voltage wiring harness and other components; sub-assembly equipment for fuel cell system; special final assembly equipment for the whole vehicle.

5.3.4 Test Equipment

Battery unit, battery module, battery system R&D test equipment, battery simulator equipment; AC power dynamometer, powertrain test stand, high performance chassis dynamometer, motor drive system assembly and other transmission system R&D test stand; fuel cell system test equipment; new energy vehicle and parts NVH test stand, new energy shift system test stand (including low temperature test stand), new energy hydraulic test bench; new energy vehicle off-line testing equipment and maintenance diagnosis equipment.

6 New Energy Industry

6.1 Nuclear power technology industry

6.1.1 Technical equipment for nuclear power plants

Million-kilowatt-class advanced pressurized water

reactor nuclear power plant equipment, fast neutron reactor and high-temperature gas-cooled reactor nuclear power plant equipment, modular small nuclear energy devices, nuclear emergency devices, nuclear-grade zirconium sponge, nuclear-grade pumps, valves, million-kilowatt-class nuclear power series of zirconium alloy clad tubes, heat transfer tubes, titanium alloy pipes for nuclear power and their pipe fittings and special materials for heat transfer tubes for nuclear power steam generators and other auxiliary equipment. Radiation-proof materials for nuclear power. Nuclear safety technology security platform. Advanced nuclear power equipment sets and engineering technology.

6.1.2 Manufacturing of nuclear fuel processing equipment

Uranium geology, metallurgical purification and conversion, uranium enrichment equipment, high-performance fuel elements, uranium-plutonium mixed oxide fuel preparation devices, advanced spent fuel reprocessing devices, nuclear radiation safety and monitoring devices, nuclear facility decommissioning and radioactive waste treatment and disposal devices, uranium and thorium associated ore comprehensive utilization technology and equipment.

6.2 wind energy industry

6.2.1 Wind turbines

Advanced and efficient onshore wind turbines and offshore wind turbines suitable for China's wind energy resources and climate conditions.

6.2.2 Wind turbine parts

All kinds of generators, wind turbine blades, bearings, gearboxes, complete control systems, pitch systems, yaw systems, converters, transformers, seals for 3 MW and above offshore and plateau type, low temperature type, low wind speed wind turbines.

6.2.3 Wind Farm Related Systems and Equipment

Wind energy measurement and application equipment, wind farm power prediction system, wind turbine online monitoring and fault diagnosis system, wind turbine blade maintenance equipment, wind farm monitoring system, wind farm remote monitoring system, wind farm group regional centralized control system, wind farm active and reactive power control system.

6.2.4 Offshore wind power related systems and equipment

Offshore wind power project preliminary ocean hydrographic observation instruments, survey equipment, wind measurement equipment, offshore wind turbine foundation production, construction, transportation, installation equipment, 220 kV AC transmission XLPE insulated submarine cables and cable accessories, $\pm 200 \sim 500$ kV DC transmission XLPE insulated submarine cables and cable accessories. Submarine cable laying equipment (including pipe guard), submarine cable fault detection equipment, offshore booster station special equipment, large flange forging equipment, construction of special high-strength grouting materials, anti-corrosion materials (including heavy anti-corrosion coatings, anode blocks, applied current protection devices) and potential detection devices, operation and maintenance of special ships and equipment, offshore wind turbine foundation online monitoring system, offshore wind power escape rescue devices, anti-collision navigation equipment.

6.2.5 Wind power technical services

Wind Power. Wind power product standard testing and certification services, wind energy resource assessment services, wind farm design and construction services, wind farm acceptance and post-evaluation services, wind farm intelligent cloud services and other operation and maintenance and optimization services, wind farm due diligence and risk assessment services.

6.3 solar industry

6.3.1 Solar Products

Photovoltaic cells and modules. Including crystalline silicon photovoltaic cells and modules, flexible gallium arsenide, silicon-based thin film, cadmium telluride, copper indium gallium selenide, chalcogenide, concentrated light and other new photovoltaic cells and modules.

Raw materials and auxiliary materials for photovoltaic cells. Including monocrystalline silicon ingots/silicon wafers, PV cell packaging materials, organic polymer electrodes, PV conductive glass (TCO glass, etc.), silane, special silver paste, high efficiency, low cost, new solar PV cell materials, long life graphite materials, high light utilization rate coating materials.

Photovoltaic system supporting products. Including grid-connected PV inverters, off-grid PV inverters, battery charge and discharge controllers, solar tracking devices, portable control and inverter integrated equipment, PV intelligent sink boxes, PV power plant monitoring equipment.

Thermal utilization products. Including medium and high temperature solar collector tubes, high efficiency flat plate collectors, heat absorbing body coating materials, high efficiency solar collector products, energy storage materials and products.

Thermal power generation products. Including high-intensity curved reflectors, concentrators,

concentrating field control devices, reducers for concentrators, controllers for concentrators, parabolic slot heat absorbers, tower heat absorbers, new metal materials for direct sealing with glass, glass tubes for sealing with metal, low heat loss fluid transfer tubes, gas absorbers, Fresnel heat absorbers, high temperature heat transfer fluids above 350° C, heat storage materials and systems, oil and salt heat exchangers, molten salt pumps, steam generators, slip parameter turbines, Stirling generators, organic Rankine cycle power generation equipment, high focus ratio solar furnaces.

6.3.2 Solar production equipment

Photovoltaic equipment. Including high purity, low energy consumption solar grade polysilicon production equipment, monocrystalline silicon drawing equipment, polysilicon ingot casting equipment, multi-wire cutting equipment, high efficiency cell and module manufacturing equipment, metal organic chemical vapor deposition equipment, epitaxial layer stripping equipment

Equipment, thin film copper indium gallium selenide absorption layer co-evaporation coating equipment, low-cost and high-efficiency atomic layer deposition buffer layer equipment, continuous roll-to-roll multi-point distributed co-evaporation coating equipment, automated integrated chip interconnection equipment, concentrator, flexible, calcium titanite, organic and other new solar cell manufacturing equipment.

Thermal utilization equipment. Including solar heating systems and equipment, solar high and medium temperature collector systems and equipment, solar air conditioning and refrigeration systems and equipment, solar heat pump air conditioning units, solar and air source heat pump hot water systems, solar energy in industrial and agricultural applications of low and medium temperature systems and equipment, solar energy and building combined collector systems, solar heat-absorbing coating coating equipment, flat-plate solar collector production equipment, solar collector products with The laser welding equipment, storage type multi-energy complementary clean energy heating, air

conditioning, hot water triple supply system.

Cogeneration equipment. Including several megawatts or tens of megawatts and solar high temperature thermal power generation system and equipment, large coating machine, glass bending and tempering equipment, laminated glass bending equipment, silver mirror preparation equipment, high frequency heater, collector tube roundness calibration machine, metal/glass sealing equipment, vacuum tube exhaust equipment, molten salt synthesis equipment, vacuum tube automatic assembly line, vacuum tube quality online monitor, high temperature heat pipe production equipment. vacuum insulation tube production line, storage heater production equipment, heliostat production line, trough type concentrator production line, trough type vacuum tube automation production line.

6.3.3 Solar Power Technology Services

Solar Power Generation. Off-grid photovoltaic power generation system technical services, distributed grid-connected photovoltaic power generation system technical services, public grid-side grid-connected photovoltaic power generation system technical services, micro-grid photovoltaic power generation system technical services, tank, tower and dish solar thermal power generation system technical services, wind and solar complementary power supply system services. Solar power product standard testing and certification services, solar energy resource assessment and power generation and power forecasting services, solar power system design and construction services, solar power system acceptance and post-evaluation services, solar power system intelligent cloud services and other operation and maintenance and optimization services, solar power system due diligence and risk assessment services.

6.4 smart grid

Intelligent transformers, rectifiers and inductors, including intelligent large transformers, DC converter

transformers, reactors, reactive power compensation equipment.

Advanced power electronic devices. High-precision and high-performance uninterruptible power supply, new dynamic reactive power compensation and harmonic control device, high-power high-voltage frequency conversion device, full digital control AC motor speed control system, electrified railway special power converter device.

Intelligent transmission and distribution and control equipment. Including 500 kV and above AC and DC transmission technology and equipment, 750 kV and above AC transmission, cross-linked polyethylene (XLPE) insulated power cables and cable accessories, advanced and reliable distribution networks and power supply and consumption systems. Large-scale grid security and defense system and intelligent dispatch system. Safe and efficient construction technology and equipment, grid environmental protection and energy saving technology and equipment, large-scale energy storage system. Renewable Energy

Source scale access and consumption, distributed power supply grid connection and control system, intelligent power distribution, power consumption technology, electric vehicle charging facilities.

Smart grid and new energy related control products. Including self-synchronous voltage source inverters, dual-mode inverters, high-power charge/discharge controllers, bidirectional converters, and micro-grid integrated automation systems.

6.5 Other new energy industries

Research and development, equipment manufacturing, engineering development and operation and maintenance services for geothermal energy generation and thermal utilization, hydrogen energy and other emerging energy technologies. Ground source heat pump and heating, air conditioning, hot water combined supply system, water (gas) source heat pump system, medium and high temperature geothermal power generation system, high-efficiency geothermal drilling equipment manufacturing, tailwater recharge equipment and geothermal water treatment equipment manufacturing, high-efficiency heat exchange

(cooling) materials, tidal power generation, wave power generation, sea current power generation, temperature difference power generation equipment.

7 Energy-saving and environmental protection industry

7.1 Energy efficient industry

7.1.1 Energy efficient boiler kiln

Industrial boiler combustion automatic control technology and equipment, oil, gas industrial boiler kiln combustion technology and equipment, new coal economizer, metallurgical heating furnace using high temperature air combustion technology, high and low differential speed circulating fluidized bed oil shale boiler, coal slurry circulating fluidized bed boiler, heat storage and stable combustion blast furnace gas boiler, distributed high efficiency pulverized coal combustion technology and equipment, large fluidized bed and other high-efficiency energy-saving boilers. High-efficiency low-pollution layer-fired chamber-fired composite combustion boilers, industrial

Industry boiler efficiency and pollutant real-time transmission and monitoring system equipment, low-temperature flue gas waste heat depth recovery equipment. Kiln insulation, kiln dust removal desulfurization denitrification and waste heat utilization integration equipment.

Advanced coal gasification technology and equipment such as multi-nozzle opposed coal-water slurry gasification, pulverized coal pressurized gasification, non-melt slag - slag coal-water slurry graded gasification, etc. Coke oven gas to ammonia, pulverized coal air bed pressurized gasification technology, coal-water slurry gasification technology, etc.

7.1.2 Electric motors and dragging equipment

Small and medium power rare earth permanent magnet ironless core motors, variable pole starting non-slip wraparound wire induction motors, permanent magnet synchronous motors and other energy efficient motor technologies and equipment. Technologies and equipment for small and medium-sized three-phase asynchronous motors, ventilators, pumps, air compressors, etc. with

energy efficiency levels of 1 and 2. High-voltage frequency conversion speed control technology and devices.

7.1.3 Waste heat, waste pressure and waste gas utilization

Key technologies and equipment for waste heat power generation. Low calorific value gas turbine, closed recovery of spent steam and condensate, screw expansion power drive, turbine low vacuum heating technology, organic Rankine cycle power generation technology, centralized heat supply based on absorption heat exchange and other technologies and equipment; high-efficiency heat exchangers, accumulators, condensers and other equipment.

Comprehensive utilization technology of mine spent air and drainage heat, unsteady state waste heat recovery and saturated steam power generation technology, thermal power plant flue gas comprehensive optimization system waste heat depth recovery technology, mine heat furnace flue gas waste heat utilization technology, oilfield oil recovery sewage waste heat comprehensive utilization technology, chlorination

Hydrogen synthesis waste heat utilization technology and other waste heat and waste pressure waste gas utilization technologies and devices, tunnels

(Roller) Road kiln radiation heat exchange type waste heat utilization technology and device.

7.1.4 Efficient energy storage, energy efficiency monitoring

and energy metering

Fast and accurate portable or vehicle-mounted energy efficiency testing equipment, online energy metering, testing technology and equipment. Thermal engineering testing portable equipment, online testing technology and equipment. Compressors, pumps, motors and other general equipment operating efficiency assessment and energy-saving transformation technology devices in petroleum, chemical, metallurgical and other process industries.

7.1.5 Energy efficient appliances

High-efficiency compressors and drive controllers for air conditioners and refrigerators, high-efficiency heat exchange and phase change energy storage devices, energy-saving technologies and devices for intelligent control of various types of home appliances. Energy-

efficient household appliances, office and commercial equipment with energy efficiency levels 1 and 2. Intelligent air-conditioning system energy-saving technology devices for enterprises, low-temperature water - direct-fired single and double-effect lithium bromide absorption chillers, dual-conditions solar heat pump air-conditioning units.

7.1.6 High Efficiency Lighting Products and Systems

Light Emitting Diode (LED) with large size open box that use sapphire, silicon carbide and other substrates, high purity metal organic compounds (MO source), high purity ammonia, new high-efficiency phosphor development, production metal organic source chemical vapor deposition equipment (MOCVD), hydride vapor phase epitaxy (HVPE) and other epitaxial equipment, high power electronic ballast for high intensity gas discharge lamp, inductively coupled plasma (ICP) etching machine and other chips, packaging key equipment, large-size high-efficiency and low-cost LED epitaxial growth, chip preparation industrialization technology devices, the

High-efficiency white LED new packaging technology and supporting materials development, high-efficiency low-cost downlights, spotlights, street lamps, tunnel lights, bulbs and other alternative semiconductor lighting light sources, new LED lighting application products, organic light-emitting diode (OLED) materials, devices, lighting product preparation and production equipment, semiconductor lighting testing technology and standards system construction, semiconductor lighting testing equipment development and testing platform construction, three-color double-ended straight fluorescent lamps (T8, T5 type) and other high-efficiency lighting products.

7.1.7 Green Building Materials

New energy-efficient wall materials, thermal insulation materials, high-performance architectural glass, composite insulation blocks and lightweight composite insulation panels, inorganic fireproof insulation materials. Low-e glass, vacuum energy-saving glass, exterior glass for photovoltaic integrated buildings. Energy-saving building doors and windows, energy-saving membranes with high thermal insulation and

safety performance and roofing waterproof and thermal insulation systems, new building wall and roofing systems that integrate energy saving, fire prevention, thermal insulation, noise reduction and other multi-functional green building materials. Functional materials to enhance the quality of the green building environment, high-performance rapid repair building materials for earthquake and disaster mitigation, building materials products with special functions such as antibacterial, anti-fouling and self-cleaning.

7.1.8 Energy efficient technologies and equipment for the mining and power industries

High-efficiency mechanized filling mining technology for comprehensive mining face, intelligent coal mining technology for unmanned working face, underground gasification coal mining technology, high-efficiency dry coal processing technology and other mechanized and automated mining equipment, shale gas mining equipment, network-wide reactive power optimization and coordination control technology for distribution networks, new energy-saving conductors, supercritical and ultra-supercritical power generating units, low-

concentration gas power generation technology for coal mines, low vacuum heating technology for coal gangue power plants, and High-efficiency and low-energy coal processing plant

Mud drying and dewatering equipment, coal gasification multi-generation gas turbine power generation equipment, low and medium calorific value gas turbines, plant insulated oil transformers, amorphous alloy transformers, dry half-core reactors, shell-type electric furnace transformers, three-dimensional coiled iron core dry-type transformers.

7.1.9 Information Energy Saving Technology and Energy Saving Services

Energy management in high energy-consuming industries such as iron and steel, comprehensive monitoring of all types of energy media in the whole production process, process energy consumption control system technology, analysis and scheduling system. Energy saving assessment, energy audit, energy saving audit, energy management system certification, energy saving low carbon product certification, carbon emission verification, etc., energy saving technology demonstration, product industrialization and promotion and application, energy saving building design, energy saving trading service, energy saving production process design and other energy saving management services.

Contract energy management services such as energy saving project proposal preparation and design, project investment and financing, engineering construction and commissioning, facility operation and maintenance, personnel energy saving training, energy saving measurement and verification, energy saving technology product certification and assessment services, energy saving project risk assessment services, energy saving service company comprehensive capacity assessment services, etc.

7.2 Advanced environmental industries

7.2.1 Water pollution control equipment

Urban sewage treatment and reuse equipment. Including ultra-fine grating, positive osmosis membrane separation equipment, energy-efficient aeration equipment, precise aeration control system, anaerobic ammonia oxidation denitrification technology and equipment, nitrogen and phosphorus resource recovery and utilization technology, electrochemical (catalytic) oxidation technology and equipment, high-power sewage disinfection and decolorization equipment, integrated sewage treatment equipment, urban domestic sewage denitrification and phosphorus removal depth treatment

technology and equipment, rapid mass transfer internal
circulation biological flow

Chemical bed sewage treatment technology and equipment, urban residential sewage sub-pipe separate treatment technology and equipment, technical equipment for urban recycled water use.

Rural wastewater treatment and reuse equipment. Including decentralized unattended sewage treatment equipment, integrated rural domestic sewage treatment equipment, livestock and poultry breeding waste water resource recycling technology and equipment, rural drinking water fluoride removal, arsenic removal technology and devices.

Technology and equipment for the treatment and reuse of difficult industrial wastewater. Including high ammonia nitrogen, high salt, high concentration of difficult to degrade organic wastewater treatment technology and equipment and heavy metals, mercury-containing wastewater treatment technology and equipment, electric flocculation and electrolytic catalytic oxidation equipment, electric desalination technology and equipment, distillation - biochemical method coupled treatment technology and complete sets of equipment, acid-

free metal material surface cleaning technology and complete sets of equipment, hydrophobic membrane distillation coupled treatment technology and its complete sets of equipment, gas-assisted oil film dispersion compared to extraction devices, buried vertical flow anaerobic sewage treatment reactor, super-rotating magnetic oxygen aeration sewage treatment device, high turbidity sewage magnetic separation treatment technology and equipment, oily sewage vacuum separation and purification machine, microwave treatment technology and complete sets of equipment, heavy metal characteristic adsorption-desorption and resource recovery complete sets of technology and equipment, heavy metal wastewater treatment and resource recovery microbial reactor, gel method heavy metal detection and adsorption integrated equipment, pressure-resistant Ultra-filtration membrane equipment, stacked vibrating membrane filtration equipment, reuse water technology equipment, wet oxidation technology and equipment, ship oily sewage, chemical wash water, ship domestic sewage receiving treatment technology and equipment.

Surface water body pollution control equipment.

Including algae and aquatic plants for anaerobic production of biogas for ethanol, algae removal technology and equipment, oil spill pollution abatement and water body restoration technology, and

Heavy metal pollution underwater immobilization and water restoration technology, comprehensive management of polluted water bodies and water ecological restoration technology and equipment, including (pollution load system reduction, low impact development of urban pollution control, river ecological restoration, lake eutrophication control and other key technology and equipment for water pollution control and management).

Groundwater pollution prevention and control and remediation equipment. Including groundwater pollution prevention technology and equipment, industrial waste storage and other typical sites groundwater pollution monitoring well network layout, optimization and installation, storage tank areas and waste storage and landfill areas and other high-risk groundwater pollution sources of horizontal barrier and vertical barrier technology devices, sewage pipe network leak detection and rapid repair technology and equipment, based on groundwater use function three-dimensional zoning groundwater characteristic pollutant remediation technology and standards, groundwater In-situ remediation

technology and equipment.

Drinking water safety and security equipment. Includes devices for enhanced drinking water treatment, efficient and safe disinfection, micro-pollution purification, pipe network water quality stabilization, direct drinking water purification, etc.

7.2.2 Atmospheric pollution control equipment

Dust removal technology and equipment. Including dust electric condensation technology and equipment, flue gas conditioning technology and equipment, electric dust high-frequency and high-voltage rectification equipment, photocatalytic components, fine particulate removal technology and equipment, tube bundle dust removal technology and equipment, high-temperature long-bag pulse bag dust removal equipment, mobile electrostatic precipitator, wet electrostatic precipitator, low-temperature electrostatic precipitator, electric bag composite dust collector, electric bag hybrid dust collector (embedded electric bag composite dust collector), power plants and industrial coal-fired kilns, ultra-clean emission technology and equipment, mobile pollution source pollutant emission

reduction technology and equipment, dust heavy pollution
places and industry dust suppression technology.

Coal-fired flue gas desulphurization and denitrification technology and equipment. Including double alkali and strong alkali desulfurization technology and equipment, ammonia desulfurization technology and equipment, coal-fired industrial boiler desulfurization, denitrification and mercury removal integrated equipment, CO cycle reduction desulfurization and denitrification technology and equipment, coke oven flue gas steel slag joint desulfurization and denitrification technology, high-pressure fine water mist desulfurization and dust removal cooling equipment, low-NO_x combustion technology and equipment, sintering flue gas composite pollutant integrated removal equipment, automotive exhaust gas efficient catalytic conversion technology, resource-based desulfurization technology and equipment, ultra-low emission limestone-gypsum desulfurization technology and equipment, coal-fired boiler full-load denitrification technology and equipment, desulfurization gypsum resource utilization technology and equipment, waste denitrification catalyst recovery and regeneration technology and equipment.

Other gas treatment equipment. Including high-flow plasma organic waste gas treatment equipment, new adsorption and recovery technology and equipment for volatile organic pollutants, new optimized catalytic combustion and heat recovery equipment for volatile organic pollutants, nitrogen oxide emission control technology and equipment for gas boilers, multi-pollutant cooperative control technology and equipment, integrated technology and equipment for pollutant removal and resource utilization, oil depots and gas recovery equipment for gas stations, acid gas treatment and sulfur recovery equipment, civil indoor air purifier.

7.2.3 Soil and site treatment and remediation equipment

Mine reclamation and ecological restoration

technology and equipment. Including soil ecological restoration and pollution treatment, joint soil and groundwater control of typical contaminated sites.

Agricultural soil pollution remediation technology and equipment. Includes equipment for pesticide contaminated site remediation, rapid xenobiotic remediation equipment for pesticide contaminated sites, etc.

Industrial contaminated site remediation equipment.
Toxic and hazardous chemicals contaminated soil treatment and remediation equipment, organic pollutants contaminated soil treatment and remediation equipment, radioactive sources contaminated soil treatment and remediation equipment, heavy metal super-enriched plant selection and breeding, plant remediation harvest safety disposal equipment, chromium slag and other heavy metals and mercury and other metal-like contaminated soil treatment and remediation equipment.

7.2.4 Solid waste treatment and disposal equipment

Sludge treatment equipment. Including sludge dewatering and drying, biological abatement, anaerobic digestion and incineration, sludge harmless treatment technology and equipment, sludge biological fermentation and deodorization integrated device, sludge oxidation abatement equipment, activated sludge biofilm composite integrated treatment equipment, sludge bioleaching treatment equipment, oil sludge rotary continuous low-temperature pyrolysis equipment, oilfield drilling waste treatment and disposal equipment, sludge coupled with

coal power efficient power generation dewatering reuse device.

Domestic waste treatment equipment. Including solid waste incineration treatment equipment, waste pyrolysis gasification treatment equipment, waste incineration exhaust gas treatment system, waste anaerobic digestion treatment equipment, waste aerobic treatment and deodorization equipment, sludge and kitchen waste and other collaborative anaerobic treatment technology equipment, rural solid waste disposal equipment, hazardous waste harmless treatment equipment, hazardous waste incineration residue, fly ash melting equipment.

7.2.5 Vibration and noise reduction equipment

Indoor low-frequency noise control equipment, solid sound pollution control equipment and integrated control, large load equipment vibration isolation, vibration reduction devices, low-frequency noise source diagnosis and treatment equipment, rail noise control technology.

7.2.6 Environmental monitoring instruments and emergency response equipment

Atmospheric pollution monitoring and testing instruments and meters. Including air quality and pollution sources online monitoring system, online PM_{2.5} composition analyzer, motor vehicle exhaust cloud detection system engineering equipment, high-precision coal combustion flue gas pollutant monitoring system for ultra-low emissions, toxic and heavy metal online monitoring system, persistent organic pollutants (POPs) automatic online detection system, volatile organic pollutants (VOCs) automatic online detection system, organic carbon/ Elemental carbon (OC/EC) automatic online analyzer, laser process gas analysis system.

Water quality pollutant monitoring and testing instruments and meters. Including online biological toxicity water quality early warning monitoring technology and equipment, portable wireless broad-spectrum intelligent spectrophotometric water pollutant detector, water quality volatile organic compound (VOC) online automatic analyzer, rapid screening instrument for genotoxic pollutants in water bodies, fine control instrumentation for wastewater treatment systems, integrated groundwater sampling and testing mobile equipment, landfill impermeable layer leakage monitoring/detection early warning system.

Ecological environment monitoring and testing instruments and meters. Including standard equipment for environmental remote sensing monitoring and traceability, multi-species intelligent biological early warning instruments, and rapid testing equipment for rural ecological environment

The system of monitoring and early warning system of environmental pollution in chemical parks and real-time monitoring system of dangerous goods transport carriers.

Solid waste detection instruments and meters.

Including soil heavy metal monitoring instruments, mobile solid waste online rapid detection devices for heavy metals and environmental risk analysis platforms.

Environmental emergency detection instruments and meters. Including portable emergency monitoring instruments for soil heavy metals, instruments and meters for monitoring and testing soil pollutants, environmental emergency monitoring vehicles (boats) and other equipment, portable field rapid measuring instruments and early warning and alarm instruments.

Environmental emergency technology and equipment. Including mobile toxic and hazardous mud and water (liquid) environmental pollution rapid emergency treatment integrated device, hazardous waste pollution accident emergency treatment equipment, mobile leachate treatment equipment, interception oil-water separation and recovery equipment, water oil spill disposal and

recovery devices.

7.2.7 Technical equipment for controlling greenhouse gas emissions

Carbon emission reduction and carbon conversion and utilization technology and equipment, carbon capture and storage technology and utilization system, greenhouse gas emission control technology and equipment in non-energy fields.

7.2.8 Marine water quality and ecological environment monitoring instruments and equipment

Nutrient automatic analyzer, various organic matter (PAH, etc.) measuring instrument, yellow organic matter measuring instrument, heavy metal monitoring equipment (mercury, lead, etc.) algae monitoring equipment, marine water quality sensor (pH, dissolved oxygen, turbidity, chlorophyll, methane, carbon dioxide, etc.) Emergency monitoring support management system for sudden marine fouling accidents, mobile field emergency monitoring equipment for marine pollution, transport monitoring system and equipment for marine polluted water bodies, etc.

7.2.9 Other environmental products

Environmental Protection Materials. Including high-performance bag filter and fibers, large-diameter pulse valve for bag filter, diaphragm-free high-pressure and low-energy pulse valve, membrane materials and membrane components, nano-scale catalytic purification materials, high-frequency power supply for electric dust collectors, chemical catalytic oxidation materials, nano-fiber biofilm carrier for water treatment, functional single-molecule composite materials and equipment for oil removal in water, high-efficiency biofilm filler, high-performance impermeable materials, in-situ groundwater pollution New functional adsorbent materials and new catalytic materials for volatile organic pollutant control. Ion exchange resin, biofilter and filler, high-efficiency activated carbon.

Environmental Protection Agents. Including new chemical phosphorus removal agents, algaecides, organic synthetic polymer flocculants, microbial flocculants, low phosphorus corrosion and scale inhibitors, microbial deodorizers, in-situ remediation agents for groundwater

pollution, cyanobacteria removal agents for lakes, sludge dewatering agents, circulating cooling water treatment agents, solid waste treatment curing agents and stabilizers.

7.2.10 Smart Water

Raw water safety warning system, water treatment adaptive dosing system, water supply network model system, water supply network leakage monitoring system, urban rainwater graded collection and treatment control system, storm emergency warning control system, precise aeration system, drainage network model system, drainage data management and simulation tool, urban water supply and drainage optimization and scheduling system, water supply and drainage information platform, low energy consumption data collection terminal, simulation instrumentation Technology.

7.2.11 Atmospheric environmental pollution control services

Support the R&D, integration and engineering of air pollution monitoring technologies and equipment. Support the R&D and engineering of air pollution control technologies and equipment. Support the R&D and engineering of advanced industrial flue gas purification technologies and equipment. Support the R&D, integration and engineering of volatile organic pollutant pollution control technologies and equipment. To support the R&D, integration and engineering of motor vehicle pollution control technologies.

7.2.12 Water environment pollution control services

Support the R&D and engineering of advanced water environment pollution monitoring, support the R&D and engineering of drinking water safety and security technologies, support the R&D and engineering of ecological treatment and restoration technologies for oceans and large lakes, support the R&D and engineering of high concentration of hard-to-degrade organic wastewater treatment technologies, and support the R&D and engineering of deep sewage treatment and recycling

technologies. Integrated decision-making on groundwater pollution prevention and control, surface water-groundwater synergy.

7.2.13 Soil environmental pollution control services

Support the R&D and engineering of soil (groundwater) environmental monitoring and assessment technologies and equipment. Support the R&D and engineering of soil pollution prevention, control and remediation technologies for agricultural land. Support the R&D and engineering of remediation technologies for organic contaminated sites. Support the R&D and engineering of remediation technologies for heavy metal contaminated sites.

7.2.14 Technical services for the prevention and control of agricultural surface sources and heavy metal pollution

Support the R&D, system integration and engineering of farmland surface source pollution prevention and control technologies. Support the R&D and engineering of heavy metal pollution farmland remediation technologies, products and equipment. Support heavy

Safe utilization of metal-contaminated arable land and alternative planting technology, product research and development and engineering. Support the research and development and engineering of technologies and equipment for the harmless consumption and utilization of agricultural organic waste. Support the R&D and engineering of village and township domestic sewage treatment technologies. Support the research and development and engineering of livestock and poultry breeding pollution control and resource recovery technologies.

7.2.15 Other environmental services

Evaluation of advanced environmental protection technology equipment and environmental protection materials and pharmaceuticals, environmental protection engineering design and consultation and engineering construction, environmental protection facilities operation effect, operation and maintenance and evaluation, environmental safety assessment, ecological efficiency evaluation service, clean production audit, environment-friendly product assessment and information

declaration, environmental service quality evaluation, environmental investment and financing and risk assessment, environmental investigation and personnel training, noise pollution detection and treatment service, the natural ecological testing and protection services, consulting services for the development and utilization of hydraulic resources, water conservation management and technical consulting services, and consulting services for ecotoxicological testing and prediction of chemicals.

Carbon trading marketization service, carbon emission data statistical accounting service, third-party certification service in the process of carbon trading, carbon trading legal service, carbon emission reduction program consultation and service, product carbon footprint evaluation service, carbon financial service, carbon information management service, green low-carbon technology consulting service.

Third-party environmental monitoring services such as enterprise environmental monitoring and environmental quality monitoring, environmental monitoring data platform development and information provision

services.

7.3 Resource recycling industry

7.3.1 Integrated utilization of mineral resources

Energy minerals. Including coal-based oil shale, kaolin and other resources development and utilization, coal tar deep processing engineering technology, oil sands, oil shale, shale gas, geothermal comprehensive utilization, digital mine, automated mining and mineral processing technology and equipment.

Comprehensive development and utilization of coalbed methane (coal mine gas). Including high-performance air drilling rigs, continuous tubing equipment, horizontal well drilling and completion, segmental fracturing and drilling measurement and geological guidance equipment, high-pressure hydraulic injection tools, special fracturing and extraction equipment for coal-bed methane, high-efficiency compression and liquefaction equipment and gas engine equipment manufacturing and application. Coal and gas prominence monitoring, gas parameters rapid determination instruments, wind exhaust gas and low concentration of gas safe and efficient power generation, concentration and liquefaction

equipment, mining (empty) area coal bed methane surface extraction equipment, downhole directional long drilling rig, fracturing production equipment manufacturing and application, microbial mining coal bed methane technology.

Ferrous minerals. Including composite force field sorting equipment, automatic control of production process and information technology. High efficiency beneficiation technology and equipment such as full magnetic sorting of fine grain magnetite, fine screening-regrinding and re-sorting of magnetite, pre-selection of poor magnetite, weak magnetic-reverse flotation of poor magnetite, permanent magnetic medium magnetic field magnetic separator, large permanent magnetic cylinder magnetic separator, magnetic field screening machine, etc.

Non-ferrous metal (including rare metal) minerals. Including pressurized leaching, biometallurgy, slurry electrolysis units, comprehensive utilization of rare earth metal ores and complex and difficult to treat rare and precious metals in the process of electrometallurgy, battery shell-breaking separation, cobalt-nickel element

purification and proto-biochemical, ultra-fine

powder re-preparation, high-efficiency dissipation technology and purification device for precious metals in waste auto exhaust catalysts, high-efficiency development device for complex copper-lead-zinc metal ore resources, high-efficiency flotation with electrochemical control, leaching-extraction-reverse extraction-electrowinning method for low-grade copper ore, coal-based direct reduction of nickel-iron for low-grade nickel oxide ore extraction, bio-oxidation pretreatment gold extraction from difficult to leach gold concentrates, comprehensive utilization of complex difficult to treat gold ores such as cyclic fluidized roasting, large mechanical agitated aerated flotation machine and other high-efficiency beneficiation technology and equipment.

Comprehensive utilization and deep processing of non-metallic minerals, including kaolin, bauxite and other co-associated non-metallic mineral resources. Advanced technology and equipment for recycling acidic wastewater from phosphate mines, recovery of fluorine and iodine resources associated with phosphate mines, extraction of lithium from carbonate-type lithium-rich

brines, multi-stage grinding and multi-stage separation of scaled graphite, beneficiation of low-grade fluorite and associated minerals, etc.

7.3.2 Integrated solid waste utilization

Coal gangue, fly ash, desulfurization gypsum, phosphogypsum, chemical slag, smelting slag, tailings and other solid waste secondary use or comprehensive utilization and technical equipment, solid waste production of cement, new wall materials and other building materials products, large admixture, high value-added comprehensive utilization products. Metallurgical soot dust recovery and rare metals efficient low-cost recovery process and equipment.

7.3.3 Resourceful and sound use of construction waste and road asphalt

Complete sets of equipment for the comprehensive utilization of mobile and fixed construction waste, construction waste production of road structural layer materials, pavement permeable materials, composite materials for municipal facilities, etc. Waste asphalt regeneration technology and equipment, asphalt regeneration materials, construction waste

Mixed material regeneration and utilization equipment. Preparation of recycled aggregate reinforcement, activation and comprehensive utilization of waste sand and ash powder devices, integrated mobile equipment for light material sorting, dust removal and noise reduction facilities.

7.3.4 Resourceful and sound utilization of kitchen waste

Food waste pre-treatment technology and equipment, food waste confinement, professional collection and transportation system. Low-energy efficient sterilization of kitchen waste and efficient recycling of waste oil, anaerobic fermentation and marsh production technology and equipment, aerobic fermentation and efficient organic fertilizer "leavening father" soil improver manufacturing technology. Kitchen waste into biodiesel, organic fertilizer and biogas, industrial ethanol and other resource-based products and purification technology and equipment. Food waste classification and recycling, reduction and harmless treatment technology.

7.3.5 Remanufacturing of automotive parts and

electromechanical products

Non-destructive testing and life assessment technology of old parts, efficient and environmentally friendly dismantling and cleaning equipment, nano-particle composite brush plating, high-speed arc spraying, plasma melting and other key technologies and equipment, remanufacturing of automotive parts, construction machinery, machine tools and basic manufacturing equipment, office equipment and other products and tire retreading. Micro and nano surface engineering, high-density energy of advanced materials preparation and molding integration equipment.

7.3.6 Resource recycling

Recycled Metals. Including separation of effective components of cans and removal of surface coatings, resource utilization of lead paste desulphurization from waste lead batteries, recycling of failed cobalt-nickel materials, 4000 hp

Above scrap steel crushing sets of equipment and other technical equipment, from the scrap of mechanical and electrical, wire and cable, cans and other products in the scale of recycling of recycled metal.

Waste rubber, waste plastic harmless regeneration and utilization. Including waste tires crushed at room temperature and atmospheric pressure continuous regeneration of rubber technology and complete sets of equipment, waste plastic composites recycling and processing of complete sets of equipment, waste tire rubber powder modified asphalt complete sets of equipment, waste tire whole tire cutting block crusher, waste tire decomposition oil and carbon black devices, paper-plastic aluminum separation, rubber and plastic separation and synthesis, deep cleaning, regeneration granulation, inorganic modified polymer regeneration and recycling and its devices. Harmless recycling of waste electromechanical products. Including waste electromechanical products sorting, dismantling Solution, high value-added use of environmentally sound treatment equipment, copper, heavy metal waste

electronic products and sludge (slag) recovery and purification of complete sets of equipment, waste household appliances and waste printed circuit boards to separate a variety of materials with high efficiency, different melting points, poor compatibility of a variety of plastic mixed directly integrated use of devices.

Dismantling and recycling of end-of-life vehicles. These include waste liquid collection devices such as vacuum oil suction machines, explosion-proof oil extraction machines, funnel-type waste oil recovery machines and special closed containers for various waste liquids, automatic dismantling equipment for end-of-life vehicles, airbag detonation devices, high-pressure hot water cleaning machines, automatic washing machines and other reuse parts cleaning equipment, precious metal recycling technology and equipment for end-of-life vehicles, complete sets of technology and equipment for body crushing and material sorting, and environmental protection facilities for oil-water separation. The technology and equipment of end-of-life vehicles End-of-life new energy vehicle power battery disassembly

technology and equipment.

Recycling of used new energy vehicle power batteries.
Including residual energy detection, dismantling, gradient
utilization and harmless recycling and other technical
equipment.

Waste solar equipment recycling. Including the recycling of used solar cell poles and silicon wafers, recycling equipment for single crystal silicon rod trimmings and silicon wafer cutting waste mortar.

Harmless recycling of used and waste textiles. Includes equipment for recycling, cleaning, sorting, sorting and reuse of waste textiles.

Waste mineral oil regeneration and utilization. Including waste mineral oil filtration and separation equipment, reduced pressure distillation equipment, and solvent refining and hydrogenation refining equipment.

Waste biomass recycling. Including straw, forest products processing residues, waste plastics and other waste materials made into wood plastic, biomass polyurethane foam materials, foaming technology, liquefaction technology devices for cellulose and lignin. Waste biomass materials such as straw, household waste, kitchen waste, forest products processing residues, landscaping waste, and urban manure made into fiber ethanol or molding fuel, energy and water-saving urban manure collection and conveying devices. Improve

the performance of domestic conversion enzymes and reduce the cost of conversion, the preparation of raw material ratios for forming fuels, preparation of special equipment and special combustion equipment for small boilers using forming fuels and charcoal, carbon dioxide bioconversion clean energy equipment, complete sets of equipment for regenerating base oil from waste oil, low energy consumption melt gasification cracking sets of equipment, biomass-type coal boilers, agricultural and forestry residues coupled with coal power efficient power generation units.

7.3.7 Unconventional water use

Wastewater treatment and reclaimed water reuse devices for high water consumption industries such as electric power, iron and steel, non-ferrous, petroleum and petrochemical, chemical, paper making, textile printing and dyeing, food processing, machinery, electronics, etc. Mine water utilization and purification devices, brackish water comprehensive utilization facilities. Rainwater collection and utilization with

Recoil technology and devices. Large-scale membrane reverse osmosis desalination membrane modules, high-pressure pumps, energy recovery and other key components and thermal desalination core components. Thermal membrane coupled seawater desalination equipment, the use of power plant waste heat and nuclear energy, wind, ocean energy and solar energy and other renewable energy for desalination equipment. Comprehensive utilization of concentrated brine and concentrated clean zero discharge equipment.

7.3.8 Resourceful and sound utilization of agroforestry waste

Crop straw return to the field, forest area three leftovers, substitute wood for plastic, making biological media, carbonized biomass fuel, polyurethane foam materials, etc., straw gasification, solidification and molding and other energy utilization equipment. Resourcefulness of livestock breeding and processing waste, comprehensive utilization of aquatic processing waste, fermentation to make feed, biogas/biomass natural gas, efficient organic fertilizer and other devices.

7.3.9 Resource recycling services

Circular economy (resource recycling) project planning and programming, project investment and risk assessment, engineering design and construction, facility operation and maintenance, environmental safety assessment and investigation, etc., circular economy project resource output rate evaluation services, resource recycling technology consulting and benefit evaluation, product certification and assessment services, circular economy resource trading and forensic services, etc.

8 digital creative industries

8.1 Digital culture and creativity

8.1.1 Digital cultural and creative technology and equipment

Virtual reality, augmented reality, holographic imaging, naked eye 3D, interactive entertainment engine development, digital processing of cultural resources, interactive film and television and other areas of advanced equipment, including virtual reality head-mounted display devices and augmented reality glasses, etc. Ultra-sensory cinema, mixed reality entertainment and broadcast film and television convergence media production and broadcast equipment, etc. Data gloves, game controllers and other motion sensing, tracking and positioning and human-computer interaction devices.

Digital art exhibition and display technology and equipment, digital conservation and heritage equipment, intelligent museums and cultural heritage sites into conservation and display equipment, libraries, art galleries and cultural centers digital equipment, etc.

Mobile eBooks, Mobile TV, Mobile TV and other terminals.

8.1.2 Digital cultural and creative software

Digital content processing software, virtual reality processing software, animation and game production engine software and development systems, home entertainment product software, other literary and artistic creation, cultural creative design and product production software that reflects interactive, virtualized, digital and networked features.

8.1.3 Digital cultural and creative content production

It mainly includes digital music, animation, film and television, games, performances, artworks, electronic publications, relying on the Internet, mobile smart terminals and other emerging media for the dissemination of

Design, development and production of advertising and mobile multimedia, etc.

8.1.4 New Media Services

The integrated development of traditional and emerging media relying on modern information infrastructure, in areas such as the integration of the three networks, based on new technologies, new modes and new business models such as next-generation radio and television networks, mobile Internet, cloud computing and the Internet of Things. It includes the digital construction of media, electronic journals and digital intelligent publishing and distribution, online libraries, digital home libraries, digital TV and movie theatres, online video, online broadcasting, interactive network TV, Internet social, mobile media and other new industries and new media.

8.1.5 Digital cultural and creative content application services

Digital processing and integration of cultural and creative contents, digital content delivery platform, multi-network channel transmission of digital contents, semantic analysis and search, etc. Digital transformation and development services for traditional cultural

products and services, services for providing digital cultural content for various emerging display and communication terminals, geographic information processing and handling services. Services that utilize technologies such as visualization and virtual reality in the field of digital content into related fields for visualization and interactive operation, such as 3D city display, visualization of urban infrastructure management, urban monitoring and industrial design, etc. Technology innovation and promotion and application services in the field of digital culture-related industries with enterprises, scientific research institutions, universities, etc. as carriers. Digital culture display and experience services with digital cultural venues such as digital libraries, art museums, experience museums and intelligent museums.

8.2 Design Services

8.2.1 Industrial Design Services

Product design, system design, process flow design, business model and service design from social, economic and technical perspectives using advanced technologies such as big data, cloud computing, Internet of Things, virtual reality, etc., combined with new materials, new technologies and new processes, etc. Industrial design tools and software, 3D printing and other areas of industrial design big data and knowledge base. Application of design services in advertising and marketing planning and brand value system construction.

8.2.2 Habitat Design Services

Habitat design services based on big data, virtual reality and other advanced technologies and advanced concepts in urban and rural planning, park and architectural design, landscape design and decoration design.

8.2.3 Other Professional Design Services

Professional design based on new ideas, new technologies, new techniques and new materials, providing

services for society and production life, including multimedia design, animation and derivative product design, ornament decoration design, art pattern design, booth design, model design and other professional design services.

8.3 Digital creativity and related industries integration

application services

It mainly includes the application of digital creativity in various fields such as e-commerce, social network, education, tourism, medical care, sports, agriculture, exhibition and display, and public administration.

9 Related services

9.1 R&D Services

Research and experimental development, R&D outsourcing, R&D design trading platform services, etc.

9.2 Intellectual Property Services

IP agency services, legal services such as IP litigation, rights defense and due diligence, information services such as IP search and analysis, data processing, database construction and software development, commercialization services such as IP evaluation, trading, transformation, escrow, investment and financing, operation and insurance, consulting services such as IP strategy, management and practice, IP education and training services, and new business models of IP services. .

9.3 Inspection and testing services

Analysis, testing, inspection, metrology and other services for the whole process of design and development, manufacturing and after-sales service, cultivating third-party quality and safety inspection, testing, quarantine, metrology and certification technical service

institutions, and building quality inspection and testing systems for products in strategic emerging industries.

9.4 Standardized services

Standard technical index experimental verification, standard information services, standard development process guidance, standard implementation and dissemination of services, based on standardization of organizational strategy consulting, management process re-engineering, transfer of scientific and technological achievements and other services, standards and related industrial integration and development derived from the "standardization +" services.

9.5 Dual Innovation Services

Construction and operation of service facilities such as “dual-innovation” demonstration bases, crowdsourcing spaces, incubators, technology exchange markets and university science and technology parks. Open source communities, developer communities, resource sharing platforms, donation platforms, entrepreneurship salons and other types of innovation and entrepreneurship platform services. Various types of entrepreneurial counseling services. Other technology intermediary services.

9.6 Professional technical services

Marine, mapping, meteorological, geological exploration and other services using high technology.

9.7 Technical extension services

Includes technology extension services for biology, agriculture, new materials, energy conservation, etc.

9.8 Related financial services

Leasing services in strategic emerging industries such as aircraft and robotics, venture capital services in strategic emerging industries, industrial investment fund management services in strategic emerging

industries, and crowdfunding platform services in strategic emerging industries.