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Order of the National Development and Reform Commission of the People's Republic of China

中華人民共和國國家發展和改革委員會令

(No. 29)

(第29號)

The Catalogue for Guiding Industry Restructuring (2019 Version), as deliberated and approved at the 2nd executive meeting on August 27, 2019, is hereby issued and shall come into force on January 1, 2020, upon which the Catalogue for Guiding Industry Restructuring (2011 Version) (Amendment) is repealed.

《產業結構調整指導目錄（2019年本）》已經2019年8月27日第2次委務會議審議通過，現予公布，自2020年1月1日起施行。《產業結構調整指導目錄（2011年本）（修正）》同時廢止。

Annex: Catalogue for Guiding Industry Restructuring (2019 Version)

附件：產業結構調整指導目錄（2019年本）

Chairman: He Lifeng

主任：何立峰

October 30, 2019

2019年10月30日

Catalogue for Guiding Industry Restructuring

產業結構調整指導目錄

(2019 Version)

(2019年本)

Category I Encouragement

第一類 鼓勵類

**I. Agriculture and Forestry****一、農林業**

1. Farmland construction and protection projects (including well-facilitated farmland construction, farmland irrigation and drainage construction, efficient water-saving irrigation and farmland consolidation and rehabilitation) and comprehensive land consolidation and rehabilitation

1、農田建設與保護工程（含高標準農田建設、農田水利建設、高效節水灌溉、農田整治等），土地綜合整治

2. Construction of agricultural product and crop seed bases

2、農產品及農作物種子基地建設

3. Development and application of advanced protected cultivation technologies for vegetables, melons, fruits, and flowers (including soilless cultivation) and development and application of high-quality, high-yield, efficient, and standardized cultivation technologies

3、蔬菜、瓜果、花卉設施栽培（含無土栽培）先進技術開發與應用，優質、高產、高效標準化栽培技術開發與應用

4. Development and application of technologies for the standardized breeding of livestock and poultry on a certain scale

4、畜禽標準化規模養殖技術開發與應用

5. Prevention and control of serious plant diseases, insect pests, and animal diseases

5、重大病蟲害及動物疫病防治

6. Selection, breeding, breed conservation, and development of the fine varieties of animals

6、動植物（含野生）優良品種選育、繁育、保種和開發，

and plants (including wild animals and plants); biological breeding; and development and application of seed (seedling) production, processing, packaging, inspection and authentication technology as well as storage and transportation equipment

7. Development and application of technologies for dry land water-saving agriculture, protective cultivation, ecological agricultural construction, arable land quality construction, rapid fertilization of new arable land, and water and fertilizer integration

8. Development and application of ecological planting (or breeding)

9. Demonstration and application of fully biodegradable plastic mulches on farmland and risk management and remediation of contaminated farmland

10. Development of feed, feed additives, fertilizers, pesticides, veterinary drugs, and other high-quality, safe and environment-friendly agricultural inputs permitted to bear marks of production materials for green food and food additives permitted to be used for green food production

11. Resource multiplication and protection projects of large inland lake basins

12. Distant fishery, artificial reefs and projects of fishery administration and fishing ports

13. Industrialized production of embryo (in vivo) and semen of cattle and sheep

14. Development and application of agricultural biotechnology

15. Arable land maintenance management and development and application of fast testing technologies for soil, fertilizer and water

16. Construction of conservation lands and conservation zones of germ plasm resources of agricultural, forestry, poultry, livestock and fishery species; collection, conservation, appraisal, development, and application of germ plasm resources of animals and plants

17. Comprehensive utilization of crop straw (utilization of straw as fertilizer, feed, energy, substrate and raw materials, among others)

18. Projects of comprehensive utilization and development of rural renewable resources (including biogas projects, bio-natural gas project, comprehensive utilization of "biogas, biogas slurry, and biogas residue," biogas-fired power generation, clean biomass heating, straw gasification and clean energy utilization projects, utilization of waste mushroom substrate bags, and solar energy utilization)

19. Comprehensive harnessing projects for grassland and forest disasters

20. Restoration of farmland to forest and grassland, restoration of pasture to grassland and natural grassland vegetation restoration projects and growing and processing of high-quality and high-yield hay

21. Development and application of new techniques and technologies for new diagnosis reagents and vaccines for animal epidemics and veterinary drugs with low toxin and low residue (including biological products for animals)

22. Planting and production of natural rubber and eucommia

23. Pollution-free agricultural products and development and application of technologies for monitoring harmful elements in the environment of producing areas

24. Development and application of technologies for the innocuous disposal of organic waste and the industrialization of organic fertilizer

25. Development and application of production technologies for pollution-free and green agricultural, husbandry, and fishery products

26. Storage, transportation, freshness maintenance, processing, and comprehensive

生物育種，種子（種苗）生產、加工、包裝、檢驗、鑒定技術和倉儲、運輸設備的開發與應用

7、旱作節水農業、保護性耕作、生態農業建設、耕地質量建設、新開耕地快速培肥、水肥一體化技術開發與應用

8、生態種（養）技術開發與應用

9、全生物降解地膜農田示範與應用及受汙染耕地風險管控與修復

10、獲得綠色食品生產資料標志的飼料、飼料添加劑、肥料、農藥、獸藥等優質安全環保農業投入品及綠色食品生產允許使用的食品添加劑開發

11、內陸流域性大湖資源增殖保護工程

12、遠洋漁業、人工魚礁、漁政漁港工程

13、牛羊胚胎（體內）及精液工廠化生產

14、農業生物技術開發與應用

15、耕地保養管理與土、肥、水速測技術開發與應用

16、農、林作物、畜禽和漁業種質資源保護地、保護區建設；動植物種質資源收集、保存、鑒定、開發與應用

17、農作物秸稈綜合利用（秸稈肥料化利用，秸稈飼料化利用，秸稈能源化利用，秸稈基料化利用，秸稈原料化利用等）

18、農村可再生資源綜合利用開發工程（沼氣工程、生物天然氣工程、“三沼”綜合利用、沼氣發電，生物質能清潔供熱，秸稈氣化清潔能源利用工程，廢棄菌棒利用，太陽能利用）

19、草原、森林災害綜合治理工程

20、退耕還林還草、退牧還草及天然草原植被恢復工程，優質高產牧草人工種植與加工

21、動物疫病新型診斷試劑、疫苗及低毒低殘留獸藥（含獸用生物制品）新工藝、新技術開發與應用

22、天然橡膠及杜仲種植生產

23、無公害農產品及其產地環境的有害元素監測技術開發與應用

24、有機廢棄物無害化處理及有機肥料產業化技術開發與應用

25、農牧漁產品無公害、綠色生產技術開發與應用

26、農林牧漁產品儲運、保鮮、加工與綜合利用

utilization of agricultural, forestry, husbandry, and fishery products

27. Protection forest projects, protection projects of natural forest and other natural resources, and forest tending and low-quality and low-efficiency forest improvement projects

28. Construction of national reserve forests, construction of characteristic economic forests, construction of carbon sequestration forests, tree and grass planting projects and forest and grass seedling projects, construction of camellia oleifera, oil palm and other woody grain and oil bases, and targeted cultivation and industrialization of biomass forests

29. Projects of comprehensive management of soil erosion and desertification and rocky desertification prevention and control and sand prevention and control projects

30. Construction of natural reserves including but not limited to ocean, forest, wildlife, wetland, desert and grassland and eco-demonstration projects

31. Production of new materials for sand stabilization, water conservation, and soil improvement

32. Cultivation of salt-tolerance and drought-enduring plants

33. Construction of bamboo, rattan and flower bases, product development and intensive and deep processing

34. Forest and grassland genetic resource protection projects and protection, improvement, development, and utilization of wild economic forest species

35. Conservation projects of rare and endangered species of wild animals and plants as well as ancient trees and famous trees

36. Deep processing and product development of inferior and small firewood, shrubs grown in sand, and "three residues" (felling residue, forest planting residue, and processing residue)

37. Construction of cultivation, taming and breeding bases of wild animals and plants and development of a monitoring and early warning system of epidemic sources and diseases

38. Planting (breeding) of fine traditional Chinese medicine and high-quality, high-yield, endangered, or rare animal and plant medicinal materials and artificial cultivation and development of underwood species including but not limited to spices and wild flowers

39. Development and application of engineered wood made from wood, bamboo, and grass (including straw) and its composite materials technology

40. Construction of turpentine orchards and deep processing of forest chemicals

41. Development and application of artificial rainfall and hail suppression and other weather modification technologies

42. Development and application of digital (information-based) agricultural, forest and grass technologies

43. Development and application of agricultural and rural environment and improvement technologies

44. Healthy freshwater and marine aquaculture and deep processing of products, multiplication and protection of marine fishery resources, and marine ranching

45. Construction of ecologically-clean small watersheds and prevention and control of non-point source pollution

46. Popularization and application of energy-saving grain and oil drying equipment, green grain storage technologies for farmers, deratization technologies, new barns for farmers (including but not limited to color plate mixing barns, rectangle barns with a **steel** skeleton, **steel** mesh drying barns, and hot-dip zinc-coated **steel** barns)

47. Development and application of automatic pest density monitoring technologies for crops

27、防護林工程，天然林等自然資源保護工程，森林撫育、低質低效林改造工程

28、國家儲備林建設，特色經濟林建設，碳彙林建設，植樹種草工程及林草種苗工程，油茶、油棕等木本糧油基地建設，生物質能源林定向培育與產業化

29、水土流失綜合治理工程，荒漠化、石漠化防治及防沙治沙工程

30、海洋、森林、野生動植物、濕地、荒漠、草原等自然保護區建設及生態示範工程

31、固沙、保水、改土新材料生產

32、抗鹽與耐旱植物培植

33、竹藤、花卉基地建設、產品開發及精深加工

34、林木、草原基因資源保護工程，野生經濟林樹種保護、改良及開發利用

35、珍稀瀕危野生動植物和古樹名木保護工程

36、次小薪材、沙生灌木及三剩物深加工與產品開發

37、野生動植物培植、馴養繁育基地及疫源疫病監測預警體系建設

38、道地中藥材及優質、豐產、瀕危或緊缺動植物藥材的種植（養殖），香料、野生花卉等林下資源人工培育與開發

39、木、竹、草（包括秸稈）人造板及其複合材料技術開發及應用

40、松脂林建設、林產化學品深加工

41、人工增雨防雹等人工影響天氣技術開發與應用

42、數字（信息）農業、林草技術開發與應用

43、農業農村環境保護與治理技術開發與應用

44、淡水與海水健康養殖及產品深加工，淡水與海水漁業資源增殖與保護，海洋牧場

45、生態清潔型小流域建設及面源汙染防治

46、糧油乾燥節能設備、農戶綠色儲糧生物技術、驅鼠技術、農戶新型儲糧倉（彩鋼板組合倉、鋼骨架矩形倉、鋼網式乾燥倉、熱浸鍍鋅鋼板倉等）推廣應用

47、農作物、林木害蟲密度自動監測技術開發與應用

and forests

48. Meteorological satellite projects (including but not limited to satellite research, development and manufacturing, supporting software systems, ground receiving and processing equipment and satellite remote sensing application technology) and meteorological information services

49. Digital transformation of agricultural production and smart agriculture projects

50. Collection and treatment of rural toilet solid waste and wastewater and kitchen solid waste and wastewater and ecological agriculture joint ventures

51. Resource-oriented coordinated comprehensive management of rural domestic wastewater, domestic waste, livestock and poultry manure, agricultural waste and non-point source pollution on farmland

52. Premium leisure agriculture and rural tourism projects

53. Treatment and resource-oriented utilization of livestock and poultry farming waste (utilization of livestock and poultry manure as fertilizer, energy, substrate and bedding and harmless treatment of sick and dead animals)

54. Digital rural area construction and accessibility of information to villages and rural households projects

55. Projects of the "Internet plus" movement of agricultural products from rural areas to urban areas

56. Development and utilization of technologies for the energy-saving, material-saving and environmental protection processing of timber and wood (bamboo) materials

57. Application of wet distillers grains with solubles ("WDGS") and application of biomass liquid organic fertilizer

II. Water Conservancy

1. River, lake and sea dyke construction and river course harnessing projects

2. Cross-basin water diversion projects

3. Water supply source projects for urban and rural areas

4. Rural drinking water safety projects

5. Construction of flood storage and retention areas

6. Projects of silt clean-up in rivers, lakes, and reservoirs

7. Risk elimination and reinforcement projects for defective and dangerous reservoirs and water gates

8. Development and application of technologies for the monitoring and elimination of hidden risks in dykes and dams

9. Urban water logging early warning and flood prevention projects

10. Improvement projects of outlets to sea

11. Key water harnessing projects for comprehensive utilization

12. Warp land dam projects

13. Development and manufacturing of geosynthetic materials and new materials for water conservancy projects

14. Construction and improvement of irrigation areas and supporting facilities

15. Popularization and application of efficient water delivery and distribution and water-saving

48、氣象衛星工程（衛星研制、生產及配套軟件系統、地面接收處理設備、衛星遙感應應用技術）和氣象信息服務

49、農業生產數字化改造和智慧農業工程

50、鄉村廁所廢物廢水以及餐廚廢物廢水的收集處理與生態農業聯合經營

51、面向資源化的鄉村生活廢水、生活廢物、畜禽糞便、農業廢棄物與農田面源污染協同綜合治理

52、休閒農業和鄉村旅遊精品工程

53、畜禽養殖廢棄物處理和資源化利用（畜禽糞汙肥料化、能源化、基料化和墊料化利用，病死畜禽無害化處理）

54、數字農村建設和信息進村入戶工程

55、“互聯網+”農產品出村進城工程

56、木材及木（竹）質材料節能、節材、環保加工技術開發與利用

57、濕態酒精糟（WDGS）的應用、生物質液體有機肥的應用

二、水利

1、江河湖海堤防建設及河道治理工程

2、跨流域調水工程

3、城鄉供水水源工程

4、農村飲水安全工程

5、蓄滯洪區建設

6、江河湖庫清淤疏浚工程

7、病險水庫、水閘除險加固工程

8、堤壩隱患監測與修復技術開發與應用

9、城市積澇預警和防洪工程

10、出海口門整治工程

11、綜合利用水利樞紐工程

12、淤地壩工程

13、水利工程用土工合成材料及新型材料開發製造

14、灌區及配套設施建設、改造

15、高效輪配水、節水灌溉技術推廣應用

irrigation technologies

16. Projects of renovation and improvement of irrigation and drainage pump stations
- 16、灌溉排水泵站更新改造工程
17. Water conservancy projects for bilharziasis prevention and control
- 17、水利血吸蟲病防治工程
18. Projects of prevention and control of geological disasters from mountain torrents (construction of the monitoring, forecasting, and early warning system for mountain torrent geological disaster prevention and control areas and control of mountain torrent ditches, debris flow gullies, and landslide)
- 18、山洪地質災害防治工程（山洪地質災害防治區監測預報預警體系建設及山洪溝、泥石流溝和滑坡治理等）
19. Protection and restoration projects of the aquatic ecosystem and underground water
- 19、水生生態系統及地下水保護與修復工程
20. Water source conservation projects (zoning of water source conservation areas, isolated protection, conservation of water and soil, protection of water resources, water ecological restoration, and development and popularization of relevant technologies)
- 20、水源地保護工程（水源地保護區劃分、隔離防護、水土保持、水資源保護、水生環境修復及有關技術開發推廣）
21. Development and application of automated system for monitoring and forecasting soil erosion
- 21、水土流失監測預報自動化系統開發與應用
22. Development of automated systems for flood control scheduling and flood risk mapping technologies and their application (thematic maps of flood information in specific areas such as middle and lower reaches of great rivers, major flood control areas, and protected areas of flood control)
- 22、防洪調動自動化系統開發、洪水風險圖編制技術及應用（大江大河中下游及重點防洪區、防洪保護區等特定地區洪澇災害信息專題地圖）
23. Construction of water resources management information system
- 23、水資源管理信息系統建設
24. Building of hydrological station and network infrastructure and capacity for monitoring hydrological and water resources
- 24、水文站網基礎設施以及水文水資源監測能力建設
25. Development and utilization of unconventional water sources
- 25、非常規水源開發利用

III. Coal

三、煤炭

1. Coalfield geological and geophysical exploration
- 1、煤田地質及地球物理勘探
2. Prevention and control of mine disasters (including but not limited to gas, coal dust, mine water, fire, wall rock, earth temperature, and rock burst)
- 2、礦井災害（瓦斯、煤塵、礦井水、火、圍岩、地溫、沖擊地壓等）防治
3. Development and application of briquette coal and coal water slurry technologies
- 3、型煤及水煤漿技術開發與應用
4. Processing and comprehensive utilization of resources co-existing and associated with coal
- 4、煤炭共生資源加工與綜合利用
5. Exploration, development and utilization of coal-bed methane and extraction and utilization of coal mine gas
- 5、煤層氣勘探、開發、利用和煤礦瓦斯採采、利用
6. Comprehensive utilization of fuels with low heat value, such as coal gangue, coal slurry, and middling
- 6、煤矸石、煤泥、洗中煤等低熱值燃料綜合利用
7. Coal conveyance through pipelines
- 7、管道輸煤
8. Development and application of clean and efficient coal washing technology
- 8、煤炭清潔高效洗選技術開發與應用
9. Control of land subsidence areas and protection and utilization of water resources in mine
- 9、地面沉陷區治理、礦井水資源保護與利用
10. Coal and electricity integration construction
- 10、煤電一體化建設
11. Development and application of coal mining methods and techniques for improving resources recovery rate
- 11、提高資源回收率的採煤方法、工藝開發與應用
12. Development and application of technologies for coal mining with coal gangue and other materials as backfill in mine void areas and under buildings, railways and other infrastructure, and water bodies
- 12、礦井採空區、建築物下、鐵路等基礎設施下、水體下採用煤矸石等物質填充採煤技術開發與應用
13. Development and application of underground rescue technologies and special equipment
- 13、井下救援技術及特種裝備開發與應用
14. Development and application of comprehensive monitoring technologies and equipment
- 14、煤礦生產過程綜合監控技術、裝備開發與應用

for the process of coal mine production

15. Construction of large-scale coal storage and transportation centers and coal trading markets and environmental protection transformation of coal storage sites

16. Development and application of new equipment for risk avoidance and self-rescue of miners

17. Intelligent mining technologies for coal mines and research, development and application of coal mine robots

18. Technologies for clean and efficient coal utilization

#### IV. Electric Power

1. Medium and large-sized hydroelectric power generation and pumped storage plants

2. Construction of ultra-supercritical power plants with a unit generating capacity of not less than 600,000 kW

3. A backpressure (extraction back-pressure) heat and electricity cogeneration unit, a heat, electricity and cooling multi-generation unit, and a (ultra-)supercritical heat and electricity cogeneration unit with a generating capacity of not less than 300,000 kW

4. Construction of a large-scale air-cool power plant with a unit capacity of not less than 600,000 kW in a water-shortage area

5. Natural gas peak-shaving power generation projects in key power load centers in areas with sufficient natural gas

6. Clean coal power generation, such as power generation by circulating fluidized bed, pressurized fluidized bed, or integrated gasification combined cycle, with a generating capacity of not less than 300,000 kW

7. Power generation with a unit generating capacity of not less than 300,000 kW by using fluidized bed boilers and utilizing gangue, middling and coal slurry, among others.

8. Direct or alternate current transmission and transformation with a capacity of not less than 500 kV

9. Ultra-low emission technologies for coal-fired generating units

10. Improvement and construction of grids and construction of incremental power distribution networks

11. Development and application of relay protection technologies and grid operation safety monitoring information technologies

12. Intensive design of large-scale power plants and large grid transformers and development and application of automation technologies

13. Development and application of inter-regional grid interconnection engineering technologies

14. Popularization and application of energy-saving and environmental protection technologies for power transmission and transformation

15. Development and application of technologies for the reduction of electric loss in the process of power transmission, transformation and distribution

16. Popularization and application of distributed power supply and grid (including micro-grid) connection technologies

17. Coordinated management of multiple pollutants for coal-fired power generating units

18. Regeneration of catalysts for waste flue gas denitration in thermal power generation and development and production of low-temperature catalysts

15、大型煤炭儲運中心、煤炭交易市場建設及儲煤場地環保改造

16、新型礦工避險自救器材開發與應用

17、煤礦智能化開采技術及煤礦機器人研發應用

18、煤炭清潔高效利用技術

#### 四、電力

1、大中型水力發電及抽水蓄能电站

2、單機60萬千瓦及以上超超臨界機組电站建設

3、采用背壓（抽背）型熱電聯產、熱電冷多聯產、30萬千瓦及以上超（超）臨界熱電聯產機組

4、缺水地區單機60萬千瓦及以上大型空冷機組电站建設

5、重要用電負荷中心且天然氣充足地區天然氣調峰發電項目

6、30萬千瓦及以上循環流化床、增壓流化床、整體煤氣化聯合循環發電等潔淨發電

7、單機30萬千瓦及以上采用流化床鍋爐並利用煤矸石、中煤、煤泥等發電

8、500千伏及以上交、直流輸變電

9、燃煤發電機組超低排放技術

10、電網改造與建設，增量配電網建設

11、繼電保護技術、電網運行安全監控信息技術開發與應用

12、大型电站及大電網變电站集約化設計和自動化技術開發與應用

13、跨區電網互聯工程技術開發與應用

14、輸變電節能、環保技術推廣應用

15、降低輸、變、配電損耗技術開發與應用

16、分布式供電及並網（含微電網）技術推廣應用

17、燃煤發電機組多污染物協同治理

18、火力發電廢煙氣脫硝催化劑再生及低溫催化劑開發生產

19. Development and application of engineering technologies for low and medium temperature water recovery measures and fish passage measures in hydropower generation
20. Development and application of large-capacity electricity storage technologies
21. Charging facilities for electric automobiles
22. Power generation technologies utilizing ventilation air methane (VAM) and development and utilization
23. Complete equipment for power generation through waste incineration
24. Distributed energy
25. High-efficiency electricity substitution technology and equipment
26. Coal and biomass co-firing power generation
27. Flexibility improvement of thermal power generating units
28. Smart energy systems

#### V. New Energy

1. Development and application of integrated technologies for solar thermal heating power generation systems and solar photovoltaic power generation systems and development and manufacturing of inverting control systems
2. Development and application of technologies for hydrogen energy, wind and photovoltaic hybrid power generation systems
3. Design and manufacturing of components for integration of solar energy and buildings
4. Efficient solar water heaters and solar hot water projects, development of medium and high temperature utilization technologies for solar energy, and equipment manufacturing
5. Development and application of production technologies of non-cereal biomass fuels, such as biomass cellulose ethanol and biofuel (diesel, gasoline and aviation kerosene)
6. Development of power generation technologies by direct combustion or gasification of biomass and equipment manufacturing
7. Development of collection, transportation and storage technologies for agricultural and forestry biomass resources and equipment manufacturing; and manufacturing of processing equipment of agricultural and forestry biomass briquette fuels, boilers, and furnaces
8. Large biogas and bio-natural gas production equipment in complete sets using crop straw, livestock and poultry manure, domestic waste, industrial organic waste, organic sewage and sludge and other urban and rural organic waste as raw materials
9. Manufacturing of biogas power generating sets, biogas purification equipment, and complete equipment for biogas supply in pipelines and biogas filling in cylinders
10. Development of marine energy and geothermal energy utilization technologies and equipment manufacturing
11. Development of technologies for offshore wind turbines of 5MW and above and equipment manufacturing
12. Construction and equipment of offshore wind farms and manufacturing of submarine cables
13. Energy routing, energy trading and other energy Internet technologies and equipment
14. Development and application of high-efficiency hydrogen production, hydrogen transportation and high-density hydrogen storage technologies and equipment

- 19、水力發電中低溫水恢復措施工程、過魚措施工程技術開發與應用
- 20、大容量電能儲存技術開發與應用
- 21、電動汽車充電設施
- 22、乏風瓦斯發電技術及開發利用
- 23、垃圾焚燒發電成套設備
- 24、分布式能源
- 25、高效電能替代技術及設備
- 26、燃煤耦合生物質發電
- 27、火力發電機組靈活性改造
- 28、智慧能源系統

#### 五、新能源

- 1、太陽能熱發電集熱系統、太陽能光伏發電系統集成技術開發應用、逆變控制系統開發製造
- 2、氫能、風電與光伏發電互補系統技術開發與應用
- 3、太陽能建築一體化組件設計與製造
- 4、高效太陽能熱水器及熱水工程，太陽能中高溫利用技術開發與設備製造
- 5、生物質纖維素乙醇、生物燃油（柴油、汽油、航空煤油）等非糧生物質燃料生產技術開發與應用
- 6、生物質直燃、氣化發電技術開發與設備製造
- 7、農林生物質資源收集、運輸、儲存技術開發與設備製造；農林生物質成型燃料加工設備、鍋爐和爐具製造
- 8、以農作物秸稈、畜禽糞便、生活垃圾、工業有機廢棄物、有機汙水汙泥等各類城鄉有機廢棄物為原料的大型沼氣和生物天然氣生產成套設備
- 9、沼氣發電機組、沼氣淨化設備、沼氣管道供氣、裝罐成套設備製造
- 10、海洋能、地熱能利用技術開發與設備製造
- 11、5MW及以上海上風電機組技術開發與設備製造
- 12、海上風電場建設與設備及海底電纜製造
- 13、能源路由、能源交易等能源互聯網技術與設備
- 14、高效制氫、運氫及高密度儲氫技術開發應用及設備製造，加氫站及車用清潔替代燃料加注站

manufacturing; and hydrogen fueling stations and clean alternative fueling stations for vehicles

15. Development and application of mobile new energy technologies

15、移動新能源技術開發及應用

16. Development and application of technologies for hybrid power generation combining traditional energy and new energy

16、傳統能源與新能源發電互補技術開發及應用

## VI. Nuclear Energy

## 六、核能

1. Geological exploration of uranium mine, uranium mining and metallurgy, uranium purification, and uranium conversion

1、鈾礦地質勘査和鈾礦采冶、鈾精制、鈾轉化

2. Construction of advanced nuclear reactors and multi-purpose small modular reactors and technology development

2、先進核反應堆及多用途模塊化小型堆建造與技術開發

3. Construction of nuclear power plants

3、核電站建設

4. Manufacturing of high-performance nuclear fuel components, MOX components and metal components

4、高性能核燃料元件、MOX元件、金屬元件制造

5. Post-processing of spent fuels

5、乏燃料後處理

6. Development of applied technologies of isotope, accelerator and irradiation

6、同位素、加速器及輻照應用技術開發

7. Development of advanced uranium isotope separation technologies and equipment manufacturing

7、先進的鈾同位素分離技術開發與設備制造

8. Development of radiation protection technologies and manufacturing of monitoring equipment

8、輻射防護技術開發與監測設備制造

9. Nuclear security key system development and equipment manufacturing

9、核安保關鍵系統開發與設備制造

10. Decommissioning of nuclear facilities and control of radioactive waste

10、核設施退役及放射性廢物治理

11. Technologies and equipment for life extension and decommissioning of nuclear power plants

11、核電站延壽及退役技術和設備

12. Technologies and equipment for emergency response and rescue of nuclear power plants

12、核電站應急搶險技術和設備

13. Comprehensive utilization of nuclear energy (heating, steam supply and seawater desalination, among others)

13、核能綜合利用（供暖、供汽、海水淡化等）

## VII. Oil and Natural Gas

## 七、石油、天然氣

1. Exploration and exploitation of conventional oil and natural gas

1、常規石油、天然氣勘探與開采

2. Exploration and development of unconventional resources, such as shale gas, shale oil, tight oil, oil sand, and natural gas hydrate

2、頁岩氣、頁岩油、致密油、油砂、天然氣水合物等非常規資源勘探開發

3. Storage and transportation of crude oil, natural gas, liquefied natural gas, and product oil and construction of pipeline transportation facilities, networks and liquefied natural gas fueling facilities

3、原油、天然氣、液化天然氣、成品油的儲運和管道輸送設施、網絡和液化天然氣加注設施建設

4. Comprehensive utilization of resources associated with oil and gas

4、油氣伴生資源綜合利用

5. Development and application of technologies for improving the recovery ratio of oil-gas fields, technologies for guaranteeing work safety, and technologies for restoring ecological environment and preventing and controlling pollution

5、油氣田提高采收率技術、安全生產保障技術、生態環境恢復與汙染防治工程技術開發利用

6. Recycling of dumped natural gas and device manufacturing

6、放空天然氣回收利用與裝置制造

7. Development and application of natural gas distributed energy technologies

7、天然氣分布式能源技術開發與應用

8. Development and application of volatile oil and gas recovery technologies for oil storage and transportation facilities

8、石油儲運設施揮發油氣回收技術開發與應用

9. Development and application of liquefied natural gas technology and equipment

9、液化天然氣技術、裝備開發與應用



## 10. Automated monitoring equipment for oil and gas recovery

**VIII. Iron and Steel**

1. Exploration of substitute resources for ferrous metal mines and development of key exploration technologies, technologies for comprehensive selection and utilization of low-grade refractory ores, and technologies and equipment for green, efficient and intelligent production of high-quality iron concentrate.

2. Research, development and application of precision control of coke oven heating, utilization of coke oven flue gas desulfurization and denitrification byproducts as resources, utilization of desulfurization waste liquid as resources, advanced treatment and reuse of coking wastewater, coal tar carbon-based materials, needle coke made from coal-tar pitch, high value-added utilization of coke oven gas, recovery of waste heat from waste gas and circulating ammonia, among others, integration of drying, forming and destructive distillation of low-rank pulverized coal and other advanced technologies and research, development and application of comprehensive advanced treatment and reuse of sewage, advanced treatment and reuse of cold rolling wastewater, treatment and reuse of sintering flue gas desulfurization wastewater and other technologies

3. Non-blast furnace ironmaking technologies

4. High-performance bearing **steel**, high-performance gear **steel**, high-performance cold heading **steel**, high-performance alloy spring **steel**, **steel** for advanced rail transport equipment, **steel** for energy-saving and new energy vehicles, low-iron loss high-magnetic strength oriented electrical **steel**, high-performance tool **steel**, high-strength earthquake-resistant **steel** bar, **steel** plate and section **steel** for building structure, ultra-high-strength bridge cable **steel**, high-performance pipeline **steel**, high-performance wear-resistant **steel**, high-performance corrosion-resistant **steel**, high-strength high-toughness **steel** for construction machinery, **steel** for marine engineering equipment and high-tech ships, special **steel** for power equipment, high-quality special **steel** for drilling, exploitation, gathering and transportation of oil and gas, high-performance stainless **steel**, high-temperature alloy, high-ductility cold-rolled ribbed **steel** bar, non-quenched and tempered **steel**, high-strength **steel** for vehicle and other machinery industries, high-purity and high-quality alloy powder, composite **steel**, and high-purity high-performance **steel** for semiconductors

5. Application of new-generation thermal machinery control processing (TMCP) technologies with online heat treatment, online performance control, and online forced cooling, direct rolling of casting billets, endless rolling, ultra-rapid cooling, energy-saving and efficient rolling, subsequent processing and other technologies

6. Development and production of ultra-high power electrode with a diameter of not less than 600 mm, micropore and ultra-micropore carbon bricks for blast furnaces, special graphite (with high strength, high density, high purity, and high modulus), graphitized (graphitiferous) cathode, lengthwise graphitization furnaces and development and production and application of environment-friendly homogenization cooling equipment

7. Production techniques of long-life, energy-saving, environment-friendly, and fireproof materials for coke furnaces, blast furnaces, and hot blast furnaces; and production techniques of low-carbon or carbon-free fireproof materials and thermal insulation materials for refined **steel** and functional, environment-friendly, and fireproof materials for efficient continuous casting

8. Quality control technology for **steel** products throughout the process

9. Disposal of waste discharged to the public by utilizing iron and **steel** production facilities (excluding hazardous waste)

10. Ultra-low emission technology in the iron and **steel** industry and by-product recycling and reutilization technologies

11. Advanced techniques and technologies for the comprehensive utilization of metallurgical

## 10、油氣回收自動監控設備

**八、鋼鐵**

1、黑色金屬礦山接替資源勘探及關鍵勘探技術開發，低品位難選礦綜合選別和利用技術，高品質鐵精礦綠色高效智能化生產技術與裝備

2、焦爐加熱精準控制、焦爐煙氣脫硫脫硝副產物資源化利用、脫硫廢液資源化利用、焦化廢水深度處理回用、煤焦油炭基材料、煤瀝青制針狀焦、焦爐煤氣高附加值利用、荒煤氣和循環氨水等余熱回收、低階粉煤幹燥成型-幹餾一體化等先進技術的研發和應用、綜合汙水深度處理回用、冷軋廢水深度處理回用、燒結煙氣脫硫廢水處理回用等技術研發和應用

3、非高爐煉鐵技術

4、高性能軸承鋼，高性能齒輪用鋼，高性能冷鐵鋼，高性能合金彈簧鋼，先進軌道交通裝備用鋼，節能與新能源汽車用鋼，低鐵損高磁感取向電工鋼，高性能工模具鋼，建築結構用高強度抗震鋼筋、鋼板及型鋼，超高強度橋梁纜索用鋼，高性能管線鋼，高性能耐磨鋼，高性能耐蝕鋼，高強度高韌性工程機械用鋼，海洋工程裝備及高技術船舶用鋼，電力裝備用特殊鋼，油氣鑽采集輸用高品質特殊鋼，高性能不鏽鋼，高溫合金，高延性冷軋帶肋鋼筋，非調質鋼，汽車等機械行業用高強鋼，高純度、高品質合金粉末，複合鋼材，半導體用高純高性能鋼

5、在線熱處理、在線性能控制、在線強制冷卻的新一代熱機械控制加工（TMCP）工藝、鑄坯直接軋制、無頭軋制、超快速冷卻、節能高效軋制及後續處理等技術應用

6、直徑600毫米及以上超高功率電極、高爐用微孔和超微孔碳磚、特種石墨（高強、高密、高純、高模量）、石墨（質）化陰極、內串石墨化爐開發與生產，環保均質化涼料設備開發與生產應用

7、焦爐、高爐、熱風爐用長壽節能環保耐火材料生產工藝，精煉鋼用低碳、無碳耐火材料、保溫材料和高效連鑄用功能環保耐火材料生產工藝

8、鋼鐵產品全流程質量管控技術

9、利用鋼鐵生產設備處理社會廢棄物（不含危險廢物）

10、鋼鐵行業超低排放技術，以及副產物資源化、再利用化技術

11、冶金固體廢棄物（含冶金礦山廢石、尾礦，鋼鐵廠產

solid waste (including but not limited to waste rocks and tailings in metallurgical mining and various dust, mud, residues, and iron sheets generated by **steelworks**); and techniques, technologies and equipment for recycling metallurgical effluent (including wastewater, waste acid and waste oil)

12. Development and application of recycling processes, techniques and technology between **steel** and related industries

13. Straight grate and other high-efficiency pelletization techniques and technology and techniques and technology for blast-furnace smelting with a high proportion of pellets

**IX. Nonferrous Metals**

1. Exploration and development of substitute resources for existing nonferrous mines and exploitation of deep and difficult-to-mine deposits of scarce resources

2. Development of efficient, low-consumption, low-pollution, and new smelting technologies

3. Recovery and comprehensive utilization on a certain scale of efficient, energy-saving, and low-pollution renewable resources. (1) Recovery and utilization of waste nonferrous metals. (2) Comprehensive utilization of valuable elements. (3) Comprehensive utilization of red mud and other smelting waste residues. (4) Extraction of alumina from high-alumina fly ash. (5) Reduction-based, resource-oriented and harmless utilization and disposal of tungsten smelting slag

4. Production of new nonferrous materials for information and new energy. (1) Information: silicon single crystal and polished section with a diameter of 200 mm or more, compound semiconductor with a diameter of 125 mm or more in LEC method or a diameter of 50 mm or more than in horizontal growth method, large-sized and high-purity targets of rare-earth aluminum, copper, silicon, tungsten, and molybdenum, ultra-high-purity rare metals and targets, high-end electronic grade polysilicon, Cu-Ni-Si and Cu-Cr-Zr lead frame materials and electronic solders, among others, for ultra-large-scale integrated circuits. (2) New energy: nuclear-grade sponge zirconium and zirconium materials and high-capacity, long-life, and secondary cell electrode materials and precursor materials

5. New nonferrous materials for transportation, high-end manufacturing, and other fields. (1) Transportation: high-strength and high-conductivity copper alloys, such as copper alloy precision strip and ultra-long wire products with compressive strength not less than 500 MPa and electric conductivity not less than 80% IACS, new high-strength, high-tenacity, corrosion-resistance alloy materials and large-sized products for key bearing structures of means of transportation (the compressive strength of aluminum alloy is not less than 650 MPa for aviation and not less than 500 MPa for high-speed trains) and high-performance magnesium alloy and its products. (2) High-end manufacturing and other fields: high-performance tungsten materials and tungsten-based composite materials for aerospace, nuclear industry, medical care and other fields, high-performance ultra-thin, ultra-thick, composite structure cemented carbide materials and deep-processed products, honeycomb-ceramic supports and rare-earth catalytic materials, biomedical materials including low-modulus titanium alloy materials and memory alloys, copper alloy and titanium alloy materials for corrosion-resistant heat exchangers, high-end metal powder materials for 3D printing, and high-quality rare-earth magnetic materials, hydrogen storage materials, optical function materials, alloy materials, special ceramic materials, additives and high-end applications

6. Continuous metal coils, vacuum coating materials and high-performance copper foil materials for new energy, semiconductor lighting, and electronics fields

**X. Gold**

1. Deep exploration and exploitation of gold (1,000 meters or deeper)

2. Recovery of gold from tailings and waste rocks

3. Efficient and comprehensive utilization of useful elements in gold smelting (dressing and

生的各類塵、泥、渣、鐵皮等) 綜合利用先進工藝技術; 冶金廢液 (含廢水、廢酸、廢油等) 循環利用工藝技術與設備

12、鋼鐵與相關產業間可循環流程工藝技術開發與應用

13、帶式焙燒等高效球團礦生產工藝技術, 高爐高比例球團冶煉工藝技術

**九、有色金屬**

1、有色金屬現有礦山接替資源勘探開發, 緊缺資源的深部及難采礦床開采

2、高效、低耗、低汙染、新型冶煉技術開發

3、高效、節能、低汙染、規模化再生資源回收與綜合利用。(1) 廢雜有色金屬回收利用。(2) 有價元素的綜合利用。(3) 赤泥及其它冶煉廢渣綜合利用。(4) 高鋁粉煤灰提取氧化鋁。(5) 鎢冶煉廢渣的減量化、資源化和無害化利用處置

4、信息、新能源有色金屬新材料生產。(1) 信息: 直徑200mm以上的矽單晶及拋光片、直徑125mm以上直拉或直徑50mm以上水平生長化合物半導體材料、鋁銅矽鎢鉬稀土等大規格高純靶材、超高純稀有金屬及靶材、高端電子級多晶矽、超大規模集成電路銅鎢矽和銅鎢鉛引線框架材料、電子焊料等。(2) 新能源: 核級海綿鎢及鎢材、大容量長壽命二次電池電極材料、前驅體材料

5、交通運輸、高端制造及其他領域有色金屬新材料。(1) 交通運輸: 抗壓強度不低于500MPa、導電率不低于80%IACS的銅合金精密帶材和超長線材制品等高强度高導銅合金、交通運輸工具主承力結構用的新型高强、高韌、耐蝕鋁合金材料及大尺寸制品 (航空用鋁合金抗壓強度不低于650MPa, 高速列車用鋁合金抗壓強度不低于500MPa)、高性能鎂合金及其制品。(2) 高端制造及其他領域: 用于航空航天、核工業、醫療等領域高性能鎢材料及鎢基複合材料, 高性能超細、超粗、複合結構硬質合金材料及深加工產品, 蜂窩陶瓷載體及稀土催化材料, 低模量鈦合金材料及記憶合金等生物醫用材料, 耐腐蝕熱交換器用銅合金及鈦合金材料, 3D打印用高端金屬粉末材料, 高品質稀土磁性材料、儲氫材料、光功能材料、合金材料、特種陶瓷材料、助劑及高端應用

6、新能源、半導體照明、電子領域用連續性金屬卷材、真空鍍膜材料、高性能銅箔材料

**十、黃金**

1、黃金深部 (1000米及以下) 探礦與開采

2、從尾礦及廢石中回收黃金

3、黃金冶煉有價元素高效綜合利用 (難處理礦石選冶回收

smelting recovery rate of refractory ore is ≥75%; dressing and smelting recovery rate of low-grade ore is ≥65% (excluding heap leaching); when gold coexists with other minerals, comprehensive utilization rate is ≥70%; and when gold is associated with other minerals, comprehensive utilization rate is ≥50%)

**XI. Petrochemistry**

1. Development and application of production technologies for high-standard oil products; and coal to p-Xylene
2. Exploration, development, and comprehensive utilization of scarce chemical mineral resources such as sulfur, potassium, boron, lithium and bromine; development and application of technology for comprehensive utilization of phosphate ore dressing tailings; selection and utilization of low- and medium-grade phosphorite and fluorite ore; and comprehensive utilization of resources associated with phosphorite and fluorite ore
3. Energy-saving technologies for zero-electrode-distance, oxygen-cathode and other ion membrane caustic soda electrolytic cells; comprehensive utilization technologies such as production of chlorine by utilizing waste hydrochloric acid; development and application of new techniques for clean production of chromium salt; yellow phosphorus production process with fully enclosed high-pressure quenched slag and treatment of phosphorus sludge not creating secondary pollution; production of potassium permanganate by utilizing pneumatic fluidization tower; production of phosphoric acid in total heat recovery method; and large-scale production device of defluorinated calcium phosphate
4. Production devices for bisphenol A of not less than 100,000 ton per year in ion exchange method, propylene oxide of not less than 150,000 ton per year in direct oxidation method, propylene oxide of not less than 200,000 ton per year in common oxidation method, and adiponitrile of not less than 10,000 ton per year in butadiene method; and development and application of production technologies for ten-thousand-ton aliphatic isocyanate
5. Production of high-quality potassium fertilizer and various special fertilizer, water soluble fertilizer, liquid fertilizer, medium and trace element fertilizer, nitro fertilizer and slow and controlled release fertilizers and development and application of comprehensive utilization technologies for phosphogypsum
6. Development and production of efficient, safe, and environment-friendly pesticides of new types and formulations, special-purpose intermediates and assistants, production of chirality and three-dimensional-structure pesticides in directional synthesis method; and development of new biological pesticide products and technologies and production
7. Production of water-based wood, industrial and marine paint, high-solids, solvent-free and radiation curable paint, environment-friendly and resource-saving low-VOC paint, and high-performance decay-resistant paint for large aircrafts, high-speed rail and other key fields; and production of titanium white chloridization with a single capacity of not less than 30,000 ton per year
8. Reactive dyes with high fixation rate, high color fastness, high upgrading, high dyeing levelness, high reproducibility, low pollution, low salt, low temperature, dyeing with small bath ratio and dyeing with a wet short steaming pad; disperse dyes with high and superfine denier polyester fiber, high fastness to chemical washing, high dyeing, high fastness and low staining (nylon and spandex), high alkali resistance, low toxicity, minor harm, environmental protection, and dyeing with small bath ratio; acid dyes of great wash fastness, fastness to chlorine bleaching, high dyeing levelness and high covering power for polyamide fiber, wool and leather; functional vat dyes of great color fastness; organic pigments of great color fastness, functional, low in aromatic amines, without heavy metals, easy to disperse, for dope dyeing; and aqueous liquid colorants made from the above dyes and pigments
9. Development and application of new technologies for clean production of dyes, organic pigments and their intermediates and intrinsic safety (including continuous sulfonation of fuming sulfuric acid, continuous nitrification, continuous acylation, continuous extraction, continuous hydrogenation reduction, continuous diazo coupling, and other continuous

率≥75%; 低品位磷石選冶回收率≥65% (不含堆浸) ; 當黃金與其他礦物共生時, 綜合利用率≥70%; 當黃金與其他礦物伴生時, 綜合利用率≥50%)

**十一、石化化工**

- 1、高標準油品生產技術開發與應用, 煤經甲醇制對二甲苯
- 2、硫、鉀、硼、鋰、溴等短缺化工礦產資源勘探開發及綜合利用, 磷礦選礦尾礦綜合利用技術開發與應用, 中低品位磷礦、螢石礦採選與利用, 磷礦、螢石礦伴生資源綜合利用
- 3、零極距、氧陰極等離子膜燒城電解槽節能技術、廢鹽酸制氯氣等綜合利用技術、鉻鹽清潔生產新工藝的開發和應用, 全封閉高壓水淬渣及無二次汙染磷泥處理黃磷生產工藝, 氣動流化塔生產高錳酸鉀, 全熱能回收熱法磷酸生產, 大型脫氯磷酸鈣生產裝置
- 4、10萬噸/年及以上離子交換法雙酚A、15萬噸/年及以上直接氧化法環氧丙烷、20萬噸/年及以上共氧化法環氧丙烷、萬噸級己二?生產裝置, 萬噸級脂肪族異氰酸酯生產技術開發與應用
- 5、優質鉀肥及各種專用肥、水溶肥、液體肥、中微量元素肥、硝基肥、緩控釋肥的生產, 磷石膏綜合利用技術開發與應用
- 6、高效、安全、環境友好的農藥新品種、新劑型、專用中間體、助劑的開發與生產, 定向合成法手性和立體結構農藥生產, 生物農藥新產品、新技術的開發與生產
- 7、水性木器、工業、船舶用塗料, 高固體分、無溶劑、輻射固化塗料, 低VOCs含量的環境友好、資源節約型塗料, 用于大飛機、高鐵等重點領域的高性能防腐塗料生產; 單線產能3萬噸/年及以上氯化法鈦白粉生產
- 8、高固著率、高色牢度、高提升性、高勻染性、高重現性、低沾污性以及低鹽、低溫、小浴比染色和濕短蒸軋染用的活性染料, 高超細旦聚酯纖維染色性、高洗滌牢度、高染著率、高光牢度和低沾污性(尼龍、氨綸)、高耐鹼性、低毒低害環保型、小浴比染色用的分散染料, 聚?胺纖維、羊毛和皮革染色用高耐洗、高氯漂、高勻染、高遮蓋力的酸性染料, 高色牢度、功能性還原染料, 高色牢度、功能性、低芳胺、無重金屬、易分散、原漿著色的有機顏料, 采用上述染料、顏料生產的水性液態著色劑
- 9、染料、有機顏料及其中間體清潔生產、本質安全的新技術(包括發煙硫酸連續磺化、連續硝化、連續?化、連續萃取、連續加氫還原、連續重氮偶合等連續化工藝, 催化、三氧化硫磺化、絕熱硝化、定向氯化、組合增效、溶劑反

應、雙氧水氧化、循環利用等技術，以及取代光氣等劇毒原料的適用技術，膜過濾和原漿乾燥技術）的開發和應用

10、乙-烯-烯醇共聚樹脂、聚偏氯乙-烯等高性能阻隔樹脂，聚異丁-烯、乙-烯-鋁-烷偶聯易，薄鋼鈍噴洗膜根竹筒澆澆澆詢担汾澆澆張壽瑩埠躑腔義楷迴汜莉と珞儒擴磁易，擄掃聞識，擄掃識，滂迥訂擄磁易，擄澆識鏡銹脹狀最怯躍澆汜莉診聲僕篳綽倣，磁躍趙撥掙義楷查萇蛭と詢秘阨倣攸眛，絳長倣攸眛齋審蕙賤擄磁易腔義楷迴汜莉と醃担蠟播輦，駮詢併擄輦張俠倣鴉健義楷迴汜莉

11、5萬噸/年及以上溴化丁基橡膠、溶聚丁苯橡膠、稀土順丁橡膠，丙烯酸酯橡膠，固含量大於60%的丁苯膠乳、異戊二烯膠乳開發與生產；合成橡膠化學改性技術開發與應用；聚丙烯熱塑性彈性體（PTPE）、熱塑性聚酯彈性體（TPEE）、氫化苯乙烯-異戊二烯熱塑性彈性體（SEPS）、動態硫化熱塑性彈性體（TPV）、有機矽改性熱塑性聚氨酯彈性體等熱塑性彈性體材料開發與生產

12、改性型、水基型膠粘劑和新型熱熔膠，環保型吸水劑、水處理劑，分子篩固汞、無汞等新型高效、環保催化劑和助劑，納米材料，功能性膜材料，超淨高純試劑、光刻膠、電子氣、高性能液晶材料等新型精細化學品的開發與生產

13、苯基矽砂烷、乙烯基矽砂烷等新型有機矽單體，苯基矽油、氨基矽油、聚醚改性型矽油等，苯基矽橡膠、苯撐矽橡膠等高性能矽橡膠及雜化材料，甲基苯基矽樹脂等高性能樹脂，三乙氧基矽烷等高效偶聯劑

14、全氟氟醚等特種含氟單體，聚全氟乙丙烯、聚偏氟乙  
烯、聚三氟氯乙烯、乙烯-四氟乙烯共聚物等高分子質氟樹  
脂，氟醚橡膠、氟矽橡膠、四丙氟橡膠、高含氟量246氟  
橡膠等高性能氟橡膠，含氟潤滑油脂，消耗臭氧潛能值  
(ODP) 為零、全球變暖潛能值 (GWP) 低的消耗臭氧層  
物質 (ODS) 替代品，全氟辛基磺化化合物 (PFOS) 和全  
氟辛酸 (PFOA) 及其鹽類的替代品和替代技術開發和應  
用，含氟精細化學品和高品質含氟無機鹽

15、高性能子午線輪胎（包括無內胎載重子午胎、巨型工程子午胎（49吋以上），低斷面和扁平化（低於55系列））及智能制造技術與裝備，航空輪胎、農用子午胎及配套專用材料和設備生產，新型天然橡膠開發與應用

16、生物高分子材料、填料、試劑、芯片、幹擾素、傳感器、纖維素生化產品開發與生產

17、四氯化碳、四氯化矽、甲基三氯矽烷、三甲基氯矽烷等副產物的綜合利用，二氧化碳的捕獲與應用

## 十二、建材

1、利用不低于2000噸/日（含）新型幹法水泥窯或不低于

(inclusive) or a new sintered brick and tile production line having capacity of not less than 60 million pieces per year (inclusive) for coordinated disposal of waste and desalination pretreatment by water washing process of incineration fly ash from the coordinated disposal of waste by cement kilns; research, development and application of processes, technologies and products for production of sulfur (iron) aluminate cement, aluminate cement, white portland cement and other special cement in new dry process cement kilns; research, development and application of new static cement clinker calcination processes and technologies; research, development and application of alternative fuel technologies for new dry process cement kilns and capture and purification technologies for flue gas carbon dioxide; development and application of cement admixture; energy-saving improvement of grinding systems (cement vertical mills and final grinders of roller press for raw materials, among others); and development and application of automated bag-inserting machine for cement packaging, packaging machine and loading machine

2. Production lines with a capacity not exceeding 150 tons per day for ultra-thin substrate glass, touch glass, high-aluminum cover glass, carrier glass, and light guide glass for the electronic information industry, technical equipment and products; high borosilicate glass and glass-ceramics; aluminosilicate glass for means of transportation and solar equipment; glass for back electrode of large-size (1 square meter or larger) copper indium gallium selenide, cadmium telluride and other thin film photovoltaic cells; energy saving, safety, display, intelligent control and other functional glass products and technical equipment; continuous automated vacuum glass production lines; full oxygen/oxygen-enriched combustion technology for glass melting furnaces; technologies and equipment for multiple plate glass production lines in one furnace; and low-conductivity fused cast zirconium corundum and long-life (12 years or above) chromium-free alkaline high-grade refractories for glass melting furnaces

3. Parts construction material products suitable for prefabricated buildings; low-cost phase-change energy storage wall materials and wall parts; parts and units of buildings integrated photovoltaic; rock-wool composite material products/parts; energy-saving aerogel materials; Class-A flame-retardant insulation materials, vacuum insulation composite materials for construction, composite boards with integrated thermal insulation, decoration and other functions, long-life, waterproofing, decay-resistant and flame-retardant composite materials for bridges and tunnels, underground pipe corridors, island and reef facilities, marine engineering facilities, and other fields, and new waterproofing materials for buildings such as modified asphalt waterproofing membranes, polymeric waterproofing membranes, and water-based or high-solid content waterproofing paint; and functional decorative and remodeling materials and products and development and application in production of technologies for green formaldehyde-free engineered wood and pavement bricks (board), permeable pavement bricks (board), permeable bricks (board) for squares, decorative bricks (block), period bricks, ecological revetment bricks (blocks), ecological grass bricks (blocks) and other green construction material products

4. Development and application of production technology for centralized ceramic powdering and clean coal gasification in ceramic parks; development and application of production lines, processes, equipment and technology for ceramic board a single piece of which is 1.62 square meters or larger in extent; and development and application of production lines, processes, equipment and technology for lightweight foam ceramic partition wall board and insulation board made from tailings and waste, among others

5. Development and production of sitting and squatting toilet pans using 6 liters or less of water per flush, water-saving household water appliances and water saving equipment, intelligent sitting toilet pans and bath ware integration systems, and integrated bath ware parts which meet the requirements for prefabrication

6. Pool kiln drawing technology for thick alkali-free glass fiber (monofilament diameter > 9 microns) with a capacity of 80,000 tons per year or more, pool kiln drawing technology for thin alkali-free glass fiber (monofilament diameter ? 9 microns) with a capacity of 50,000 tons per year or more, and development of technology for and production of ultra-thin, high-strength and high-modulus, alkali-resistant, low- $\epsilon$  dielectric, high-silica, degradable, odd-

6000萬塊/年(含)新型燒結磚瓦生產線協同處置廢棄物, 水泥窯協同處置垃圾焚燒飛灰使用水洗工藝脫鹽預處理; 新型幹法水泥窯生產硫(鐵)鋁酸鹽水泥、鋁酸鹽水泥、白色矽酸鹽水泥等特種水泥工藝技術及產品的研發與應用; 新型靜態水泥熟料?燒工藝技術的研發與應用; 新型幹法水泥窯替代燃料技術、煙氣二氧化碳捕集純化技術的研發與應用; 水泥外加劑的開發與應用; 粉磨系統節能改造(水泥立磨、生料輥壓機終粉磨等); 水泥包裝自動插袋機、包裝機、裝車機開發與應用

2、規模不超過150噸/日(含)的電子信息產業用超薄基板玻璃、觸控玻璃、高鉛蓋板玻璃、載板玻璃、導光板玻璃生產線、技術裝備和產品; 高硼矽玻璃, 微晶玻璃; 交通工具和太陽能裝備用鋁矽酸鹽玻璃; 大尺寸(1平方米及以上)銅鋅鎵碲和碲化銅等薄膜光伏電池背電極玻璃; 節能、安全、顯示、智能調控等功能玻璃產品及技術裝備; 連續自動化真空玻璃生產線; 玻璃熔窯用全氧/富氧燃燒技術; 一窯多線平板玻璃生產技術與裝備; 玻璃熔窯用低導熱熔鑄鋁剛玉、長壽命(12年及以上)無鉻酸性高檔耐火材料

3、適用於裝配式建築的部品化建材產品; 低成本相變儲能牆體材料及牆體部件; 光伏建築一體化部品部件; 岩棉複合材料制品/部品; 氣凝膠節能材料; A級阻燃保溫材料制品, 建築用複合真空絕熱保溫材料, 保溫、裝飾等功能一體化複合板材, 橋梁隧道、地下管廊、島礁設施、海工設施等領域用長壽命防水防腐阻熱複合材料, 改性瀝青防水卷材、高分子防水卷材、水性或高固含量防水塗料等新型建築防水材料; 功能型裝飾裝修材料及制品, 綠色無醛人造板以及路面磚(板)、路面透水磚(板)、廣場透水磚(板)、裝飾磚(砌塊)、仿古磚、護坡生態磚(砌塊)、水工生態磚(砌塊)等綠色建材產品技術開發與生產應用

4、陶瓷集中制粉、陶瓷園區清潔煤制氣生產技術開發與應用; 單塊面積大於1.62平方米(含)的陶瓷板生產線和工藝裝備技術開發與應用; 利用尾礦、廢棄物等生產的輕質發泡陶瓷隔牆板及保溫板材生產線和工藝裝備技術開發與應用

5、一次沖洗用水量6升及以下的坐便器、蹲便器, 節水型生活用水器具及節水控制設備, 智能坐便器、衛浴集成系統, 滿足裝配式要求的整體衛浴部品開發與生產

6、8萬噸/年及以上無城玻璃纖維粗紗(單絲直徑>9微米)池窯拉絲技術, 5萬噸/年及以上無城玻璃纖維細紗(單絲直徑?9微米)池窯拉絲技術, 超細、高強高模、耐城、低介電、高砂氧、可降解、異形截面等高性能玻璃纖維及玻纖制品技術開發與生產; 玄武岩纖維池窯拉絲技

shaped-profile and other high-performance glass fiber and glass fiber products; pool kiln drawing technology for basalt fiber; silicon carbide fiber and composite fiber; thermoplastic and thermosetting composite material products for aerospace, environmental protection, marine engineering, electrical engineering and electronics, transportation, energy, construction, Internet of Things, animal husbandry and other fields and their efficient molding preparation processes and equipment; recycling technologies and equipment for waste resin-based composite materials; and mineral raw material powder processing production lines with a capacity of 200,000 tons per year or more

7. Development and production of new technologies and new products of asbestos-free friction and sealing materials using synthetic mineral fiber or aramid fiber as reinforcing material

8. Production equipment technology development of high-quality artificial crystalline materials, products, and parts for fields such as information, new energy, national defense, and aerospace aviation and functional artificial diamond materials; development of manufacturing technology for and production of high-purity quartz raw materials (purity greater than or equal to 99.999%), high-end quartz crucibles for semiconductors, and chemical vapor synthesis quartz glass, among others; development of manufacturing technologies for and production of special glass required for aerospace and other fields; and production and application of high-purity nanometer-scale spherical silicon powder and high-purity industrial silicon and development and application of their technical equipment

9. Production, application and development of graphene materials; production of non-metallic functional mineral materials for environmental governance, energy conservation and storage, electronic information, thermal insulation, and agriculture and development and application of their technical equipment; online testing and production lines under intelligent control for superfine mineral material processing; and development of technology for and construction of non-metallic ore exploitation, processing, trade, application, investment and other industry big data platforms

10. Production of ultra-thin composite stone with an annual yield of 300,000 square meters or more; mining of mechanized stone mines; mechanized quarrying; and production for the comprehensive utilization of ore and sheet scraps and stone powder and development of technical equipment; and production of inorganic artificial stone and production of resin-based artificial stone using non-toxic or low-toxic resins

11. Production of construction materials by utilizing mine tailings, construction waste, industrial waste, river, lake, (canal) and sea silt, agricultural and forestry residues and other secondary resources and development of their techniques and technical equipment

12. Fine ceramic powder as well as ceramic precursors suitable and chopped ceramic fiber for additive manufacturing; ceramic balls, ceramic valves, ceramic screws and other precision-molded ceramic parts; ceramic membranes, honeycomb ceramics, and foam ceramics; ceramic substrates, ceramic insulating parts, and electronic ceramic materials and parts; continuous ceramic fiber and fiber-reinforced ceramic matrix composite materials; medical fine ceramic materials and parts; ceramic ink materials; development and application in production of technology for ceramic materials and other industrial ceramics for precision grinding and polishing; and development of manufacturing technologies for and production of high-performance ceramics for information, new energy, defense, aerospace and other fields

13. Achieving the full enclosure of main production areas such as storage area, host mixing building and material conveying system, assigning active dust collection and reduction equipment, using informatized integrated management system for operation and management, and having an intelligent ready-mixed concrete production line capable of consuming urban solid waste; and development and application of concrete for marine projects, lightweight and high-strength concrete, ultra-high performance concrete and self-healing concrete materials

14. Development and application of product quality traceability system for construction materials for projects or equipment

術; 碳化矽纖維、複合纖維; 航空航天、環保、海工、電工電子、交通、能源、建築、物聯網、畜牧養殖等領域用熱塑性、熱固性複合材料產品及其高效成型制備工藝和裝備; 樹脂基複合材料廢棄物回收利用技術與裝備; 20萬噸/年及以上礦物原料粉體加工生產線

7、使用合成礦物纖維、芳綸纖維等作為增強材料的無石棉摩擦、密封材料新工藝、新產品開發與生產

8、信息、新能源、國防、航天航空等領域用高品質人工晶體材料、制品和器件, 功能性人造金剛石材料生產裝備技術開發; 高純石英原料(純度大於等於99.999%)、半導體用高端石英坩堝、化學氣相合成石英玻璃等製造技術開發與生產; 航天航空等領域所需的特種玻璃製造技術開發與生產; 高純納米級球形矽微粉與高純工業矽的生產、應用及其技術裝備開發與應用

9、石墨烯材料生產及應用開發; 環境治理、節能儲能、電子信息、保溫隔熱、農業用等非金屬礦物功能材料生產及其技術裝備開發應用; 礦物超細材料加工在線檢測與控制智能化生產線; 非金屬礦開采、加工、貿易、應用、投資等產業大數據平台技術開發和建設

10、30萬平方米/年及以上超薄複合石材生產; 機械化石材礦山開采; 礦石碎料和板材邊角料、石粉綜合利用生產及工藝裝備開發; 無機人造石的生產, 採用無毒或低毒樹脂的樹脂基人造石的生產

11、利用礦山尾礦、建築廢棄物、工業廢棄物、江河湖(渠)海淤泥以及農林剩餘物等二次資源生產建材及其工藝技術裝備開發

12、精細陶瓷粉體、適用於增材製造的陶瓷前驅體及陶瓷短切纖維; 陶瓷球、陶瓷閥門、陶瓷螺桿等精密成型的陶瓷部件; 陶瓷膜、蜂窩陶瓷、泡沫陶瓷; 陶瓷基板、陶瓷絕緣部件、電子陶瓷材料及部件; 連續陶瓷纖維及纖維增強陶瓷基複合材料; 醫用精細陶瓷材料及部件; 陶瓷墨水材料; 精密研磨及拋光用陶瓷材料等工業陶瓷技術開發與生產應用; 信息、新能源、國防、航空航天等領域用高性能陶瓷的製造技術開發與生產

13、儲料區、主機攪拌樓、物料輸送系統等主要生產區域實現全封閉, 並配置主動式收塵、降塵設備, 採用信息化集成管理系統進行運營管理, 具備消納城市固廢能力的智能化預拌混凝土生產線; 海洋工程用混凝土、輕質高強混凝土、超高性能混凝土、混凝土自修復材料的開發和應用

14、用於工程或裝備的建材產品質量追溯體系開發與應用

**XIII. Medicine**

1. Development and production of new medicine with independent intellectual property right, development and production of natural medicine, initial development and production of generic medicine that meets China's demand for prevention and control of grave and frequent diseases, development and production of new formulations, new inactive ingredients, drugs for children and drugs in short supply, development and application of technologies in the process of medicine production such as membrane separation, supercritical extraction, new crystallization, chiral synthesis, enzymatic synthesis, continuous reaction and system control, improvement of basic drug quality and production technology and cost reduction, and development and application of energy-saving and consumption-reduction technologies in the production of Active Pharmaceutical Ingredients (APIs) and new pharmaceutical preparation technologies

2. Critical disease prevention vaccines, antibody drugs, gene therapy drugs, cellular therapy drugs, recombinant protein drugs, and nucleic acid drugs; development and application of large-scale cell culture and purification technologies as well as large-scale therapeutic peptide and nucleic acid synthesis, antibody coupling, and serum-free and protein-free media culture, fermentation, purification technologies; cellulase, alkaline protease, diagnostic enzymes, and other enzyme preparations; and using modern biotechnology to improve traditional production techniques

3. Development and production of new pharmaceutical packaging materials and technologies (neutral borosilicate glass for pharmaceutical use, functional materials with good chemical stability, degradability, and high barrier properties, and aerosol, powder aerosol, self-administration, prefillable, automatic drug mixing and other new drug containment and delivery systems and drug delivery devices)

4. Development of artificial breeding technology for endangered and scarce medicinal animals and plants, standardized breeding of laboratory animals and animal experiment services, application of advanced agricultural technologies in the standardized planting and breeding of Chinese medicinal materials, development and application of new technology for quality control of Chinese medicine, modern formulation techniques and technologies of Chinese medicine, inheritance of and innovation in processing technology for Chinese medicinal herb slices, development and production of classical and famous Chinese medicine prescriptions, research and development and production of innovative Chinese medicine, secondary development and production of Chinese patent medicine, and development and production of ethnic drugs

5. New medical diagnostic equipment and reagents and digital medical imaging equipment; artificial intelligence-assisted medical equipment; high-end radiotherapy equipment; electronic endoscopes, surgical robots, and other high-end surgical equipment; development and application of new stents, prostheses, and other high-end implanted intervention equipment and materials as well as additive manufacturing technology; life support equipment for critically ill patients; mobile and remote diagnostic equipment; and new gene, protein, and cell diagnostic equipment

6. Development and production of high-end pharmaceutical equipment, production equipment for transdermal absorption, powder aerosol, and other new preparations, large-scale bioreactors and auxiliary systems, high-efficiency protein separation and purification equipment, high-efficiency extraction equipment for Chinese medicine, and continuous drug production technology and equipment

**XIV. Machinery**

1. High-end CNC machine tools and supporting CNC systems: CNC machine tools operated on five or more axes, CNC systems, high-precision and high-performance cutting tools, measuring instruments, and abrasives

2. Distributed control systems (DCS), fieldbus control systems (FCS), and new energy power generation control systems used for major technical equipment, such as large generating sets, large petrochemical installations, and large complete metallurgical equipment

**十三、醫藥**

1、擁有自主知識產權的新藥開發和生產，天然藥物開發和生產，滿足我國重大、多發性疾病防治需求的通用名藥物首次開發和生產，藥物新劑型、新輔料、兒童藥、短缺藥的開發和生產，藥物生產過程中的膜分離、超臨界萃取、新型結晶、手性合成、?促合成、連續反應、系統控制等技術開發與應用，基本藥物質量和生產技術水平提升及降低成本，原料藥生產節能降耗減排技術、新型藥物制劑技術開發與應用

2、重大疾病防治疫苗、抗體藥物、基因治療藥物、細胞治療藥物、重組蛋白質藥物、核酸藥物，大規模細胞培養和純化技術、大規模藥用多?和核酸合成、抗體偶聯、無血清無蛋白培養基培養、發酵、純化技術開發和應用，纖維素?、城性蛋白?、診斷用?等?制劑，采用現代生物技術改造傳統生產工藝

3、新型藥用包裝材料與技術的開發和生產（中性硼矽藥用玻璃，化學穩定性好、可降解、具有高阻隔性的功能性材料，氣霧劑、粉霧劑、自我給藥、預灌封、自動混藥等新型包裝給藥系統及給藥裝置）

4、瀕危稀缺藥用動植物人工繁育技術開發，實驗動物標準化養殖及動物實驗服務，先進農業技術在中藥材規範化種植、養殖中的應用，中藥質量控制新技術開發和應用，中藥現代劑型的工藝技術，中藥錠片炮制技術傳承與創新，中藥經典名方的開發與生產，中藥創新藥物的研發與生產，中成藥二次開發和生產，民族藥物開發和生產

5、新型醫用診斷設備和試劑、數字化醫學影像設備，人工智能輔助醫療設備，高端放射治療設備，電子內窺鏡、手術機器人等高端外科設備，新型支架、假體等高端植入介入設備與材料及增材制造技術開發與應用，危重病用生命支持設備，移動與遠程診療設備，新型基因、蛋白和細胞診斷設備

6、高端制藥設備開發與生產，透皮吸收、粉霧劑等新型制劑生產設備，大規模生物反應器及附屬系統，蛋白質高效分離和純化設備，中藥高效提取設備，藥品連續化生產技術及裝備

**十四、機械**

1、高檔數控機床及配套數控系統：五軸及以上聯動數控機床，數控系統，高精密、高性能的切削刀具、量具量儀和磨料磨具

2、大型發電機組、大型石油化工裝置、大型冶金成套設備等重大技術裝備用分散型控制系統（DCS），現場總線控制系統（FCS），新能源發電控制系統

3. Programmable logic controllers (PLC) with the functionality of motion control and remote I/O, with more than 512 inputs and outputs, an independent software system, and an independent communication protocol, compatible with multiple common communication protocols, supporting real-time multitasking, with diverse programming languages and a customizable instruction set, among others.

4. Digital, intelligent, and networked industrial automated detection meters, in-situ online component analysis instruments, electromagnetic compatibility testing devices, intelligent ammeters used for intelligent grids (with functions of sending and receiving signals, self-diagnosis, and data processing), various low-power smart sensors with wireless communication function, encrypted sensors, and nuclear-level monitoring instruments and sensors

5. Instruments and meters used for the detection and analysis of radiation, toxicity, flammables, explosives, heavy metals, and dioxins, among others, testing instruments for water quality, flue gas and air; and high-end mass spectrometers for drug, food, and biochemical testing, chromatographs, spectrometers, X-ray instrument, nuclear magnetic resonance spectrometers, automatic biochemical detection systems, automatic sampling systems, and sample processing systems

6. Multi-dimensional geometric parameter measuring instruments used for scientific research, intelligent manufacturing, and testing qualifications with a measurement precision of micron or a more precise measurement, automated, intelligent and multi-functional material mechanics performance testing equipment, non-destructive testing equipment such as industrial CT and three-dimensional ultrasonic flaw detector, and electron microscopes used for nanometer observation and measurement with a resolution higher than 3.0 nm

7. Technical equipment for urban intelligent visual surveillance, video analysis, and video-assisted criminal investigation

8. Monitoring instruments and meters and safety alarm systems for mine disasters (gas, coal dust, mine water, fire, and wall rock noise, vibration, among others)

9. Comprehensive meteorological observation instruments and equipment (ground, high altitude, and marine meteorological observation instruments and equipment, professional meteorological observation and atmospheric composition observation instruments and equipment, weather radars, and consumables, among others), mobile emergency meteorological observation systems, mobile emergency meteorological command systems, meteorological measurement checking equipment, and operation monitoring systems of meteorological observation instruments and equipment

10. Hydrological data collection instruments and equipment and hydrological instrument measurement checking equipment

11. Instruments and meters for the monitoring of earthquakes and geological disasters

12. Ocean observation, detection, and monitoring technical systems, instruments, and equipment

13. Digital multifunctional integrated office equipment (copying, printing, fax, and scanning), digital cameras, digital cinema projectors, and other modern cultural and office equipment

14. Bearings of China Railway High-Speed (CRH) trains with a speed of 200 kilometers per hour or higher, bearings of heavy haul railway wagons with an axle load of 30 tons or more, bearings for high-power electric/diesel locomotives, bearings of new urban rail transit with a service life of 2.4 million kilometers or more, light-weight and low-friction torque automotive bearings and units with a service life of 250,000 kilometers or more, high temperature-resistant (400°C or above) automobile turbines, supercharger bearings, numerically-controlled machine tool bearings of Classes P4 and P2, all kinds of precision bearings used for wind turbines of two megawatts (MW) or higher, bearings of large construction machinery such as shield machines with a service life of more than 5,000 hours, high-speed and precision metallurgical rolling mill bearings of Classes P5 and P4, aircraft engine bearings and

3、具備運動控制功能和遠程IO的可編程控制系統（PLC），輸入輸出點數512個以上，擁有獨立的軟件系統、獨立的通訊協議、兼容多種通用通訊協議、支持實時多任務、擁有多樣化編程語言、擁有可定制化指令集等

4、數字化、智能化、網絡化工業自動檢測儀表，原位在線成份分析儀器，電磁兼容檢測設備，智能電網用智能電表（具有發送和接收信號、自診斷、數據處理功能），具有無線通信功能的低功耗各類智能傳感器，可加密傳感器，核級監測儀表和傳感器

5、用于輻射、有毒、可燃、易爆、重金屬、二噁英等檢測分析的儀器儀表，水質、煙氣、空氣檢測儀器；藥品、食品、生化檢驗用高端質譜儀、色譜儀、光譜儀、X射線儀、核磁共振波譜儀、自動生化檢測系統及自動取樣系統和樣品處理系統

6、科學研究、智能制造、測試認證用測量精度達到微米以上的多維幾何尺寸測量儀器，自動化、智能化、多功能材料力學性能測試儀器，工業CT、三維超聲波探傷儀等無損檢測設備，用于納米觀察測量的分辨率高于3.0納米的電子顯微鏡

7、城市智能視覺監控、視頻分析、視頻輔助刑事偵察技術設備

8、礦井災害（瓦斯、煤塵、礦井水、火、圍岩噪聲、振動等）監測儀器儀表和安全報警系統

9、綜合氣象觀測儀器裝備（地面、高空、海洋氣象觀測儀器裝備，專業氣象觀測、大氣成分觀測儀器裝備，氣象雷達及耗材等）、移動應急氣象觀測系統、移動應急氣象指揮系統、氣象計量檢定設備、氣象觀測儀器裝備運行監控系統

10、水文數據采集儀器及設備、水文儀器計量檢定設備

11、地震、地質災害監測儀器儀表

12、海洋觀測、探測、監測技術系統及儀器設備

13、數字多功能一體化辦公設備（複印、打印、傳真、掃描）、數字照相機、數字電影放映機等現代文化辦公設備

14、時速200公裏以上動車組軸承，軸重23噸及以上大軸重重載鐵路貨車軸承，大功率電力/內燃機車軸承，使用壽命240萬公裏以上的新型城市軌道交通軸承，使用壽命25萬公裏以上輕量化、低摩擦力矩汽車軸承及單元，耐高溫（400°C以上）汽車渦輪、機械增壓器軸承，P4、P2級數控機床軸承，2兆瓦（MW）及以上風電機組用各類精密軸承，使用壽命大于5000小時盾構機等大型施工機械軸承，P5級、P4級高速精密冶金軋機軸承，飛機發動機軸承及其他航空軸承，醫療CT機軸承，深井超深井石油鑽機軸承，海洋工程軸承，電動汽車驅動電機系統高速軸承（轉速？



other aircraft bearings, medical CT machine bearings, bearings for deep well and ultra-deep well oil rigs, marine engineering bearings, high-speed bearings for the electric motor systems of electric vehicles (speed ? 12,000 rpm), bearings for the RV reducers and harmonic reducers of industrial robots, and parts of the above bearings

15. Francis hydroelectric equipment with a unit capacity of 800,000 kilowatts or above (water turbines, generators, governors, excitation, and other ancillary equipment), pumped-storage hydroelectric equipment with an unit capacity of 350,000 kilowatts or above, tubular hydroelectric equipment with a unit capacity of 50,000 kilowatts or above, pelton hydroelectric equipment with a unit capacity of 100,000 kilowatts or above, and their key supporting auxiliary engines

16. Generator circuit breakers, pumps, valves, and other key ancillary engines and parts used for supercritical and ultra-supercritical thermal power units of 600,000 kilowatts or above

17. Supercritical parameters circulating fluidized bed boilers of 600,000 kilowatts or above

18. Gas turbine high temperature components (rotor body forgings for heavy-duty gas turbines of more than 300MW, large high-temperature alloy discs, cylinders, and blades, among others) and control systems

19. Rotors (forging or welding), runners, blades, pumps, valves, spindle rings, and other key castings and forgings used for power generation equipment of 600,000 kilowatts or above

20. High-strength and high-plasticity ductile iron castings; high-performance vermicular graphite iron castings; high-precision, high-pressure, and large-flow castings for hydraulic use; nonferrous alloy castings made by special casting techniques; high-strength **steel** forgings; high temperature-resistant, low temperature-resistant, corrosion-resistant, wear-resistant, and other high-performance and lightweight new material castings and forgings; high-precision and low-stress castings and forgings for machine tools; and key castings and forgings for vehicles, energy equipment, rail transit equipment, aerospace, arms, and marine engineering equipment

21. Extra-high-voltage and ultra-high-voltage alternating current and direct current power transmission equipment of 500 kilovolt (kV) and above and key parts: transformer (outlet devices, casing, and pressure switches), switching devices (arc-control devices, hydraulic operating mechanism, and large basin insulators), high-intensity post insulators and hollow insulators, suspension composite insulators, molded insulation, ultra-high voltage arresters, direct current arresters, electric control and light control thyristors, converter valves (flat wave reactors and cooling equipment), control and protection equipment, and direct current field outfits, among others

22. High-voltage vacuum components and switchgears, intelligent medium-voltage switch components and outfits, insulated switch cabinets using environment-friendly medium-voltage gas, intelligent (communicable) low-voltage electrical appliances, and amorphous alloy, roll-core, and other energy-saving distribution transformers

23. The second-generation improved, third-generation, and fourth-generation nuclear power equipment and key parts; multi-purpose small modular reactor equipment and key parts; complete wind power machines of 2.5 megawatts or above, and control systems, converters and other key components and parts of wind power equipment of 2.0 megawatts or above; production equipment of various types of crystalline silicon and thin film solar photovoltaic cells; power generation equipment using ocean energy (tide, wave, and ocean current)

24. Short-process molten techniques and equipment directly using blast furnace melted iron to manufacture iron castings; central smelting and short-process casting techniques and equipment for aluminum alloy; production techniques and equipment for high-purity pig iron for casting and ultra-high-purity pig iron for casting; high-tightness clay modeling automatic production lines and supporting clay processing systems; high-efficiency complete equipment for self-hardening sand and supporting sand processing system; complete technology and equipment for lost foam/V-process/full mold casting; external heat blast water-cooled cupolas with a long service life and large tonnage (10 tons or more per hour); waste heat utilization

1.2萬轉/分鐘)，工業機器人RV減速機諧波減速機軸承，以及上述軸承的零件

15、單機容量80萬千瓦及以上混流式水力發電設備（水輪機、發電機及調速器、勵磁等附屬設備），單機容量35萬千瓦及以上抽水蓄能、5萬千瓦及以上貫流式和10萬千瓦及以上沖擊式水力發電設備及其關鍵配套輔機

16、60萬千瓦及以上超臨界、超超臨界火電機組用發電機保護斷路器、泵、閘等關鍵配套輔機、部件

17、60萬千瓦及以上超臨界參數循環流化床鍋爐

18、燃氣輪機高溫部件（300MW以上重型燃機用轉子體鍛件、大型高溫合金輪盤、缸體、葉片等）及控制系統

19、60萬千瓦及以上發電設備用轉子（鍛造、焊接）、轉輪、葉片、泵、閘、主軸護環等關鍵鑄件、鍛件

20、高強度、高塑性球墨鑄鐵件；高性能蠕墨鑄鐵件；高精度、高壓、大流量液壓鑄件；有色合金特種鑄造工藝鑄件；高強鋼鍛件；耐高溫、耐低溫、耐腐蝕、耐磨損等高性能，輕量化新材料鑄件、鍛件；高精度、低應力機床鑄件、鍛件；汽車、能源裝備、軌道交通裝備、航空航天、軍工、海洋工程裝備關鍵鑄件、鍛件

21、500千伏（kV）及以上超高壓、特高壓交流輸電設備及關鍵部件：變壓器（出線裝置、套管、調壓開關），開關設備（滅弧裝置、液壓操作機構、大型盆式絕緣子），高強度支柱絕緣子和空心絕緣子，懸式複合絕緣子，絕緣成型件，特高壓避雷器、直流避雷器，電控、光控晶閘管，換流閘（平波電抗器、水冷設備），控制和保護設備，直流場成套設備等

22、高壓真空元件及開關設備，智能化中壓開關元件及成套設備，使用環保型中壓氣體的絕緣開關櫃，智能型（可通信）低壓電器，非晶合金、卷鐵芯等節能配電變壓器

23、二代改進型、三代、四代核電設備及關鍵部件，多用途模塊化小型堆設備及關鍵部件；2.5兆瓦以上風電設備整機及2.0兆瓦以上風電設備控制系統、變流器等關鍵零部件；各類晶體矽和薄膜太陽能光伏電池生產設備；海洋能（潮汐、海浪、洋流）發電設備

24、直接利用高爐鐵液生產鑄鐵件的短流程熔化工藝與裝備；鋁合金集中熔煉短流程鑄造工藝與裝備；鑄造用高純生鐵、鑄造用超高純生鐵生產工藝與裝備；粘土砂高緊實度造型自動生產線及配套砂處理系統；自硬砂高效成套設備及配套砂處理系統；消失模/V法/實型成套技術與裝備；外熱送風水冷長爐齡大噸位（10噸/小時以上）冲天爐；外熱風冲天爐余热利用技術與裝備；大型壓鑄機（合模力3500噸以上）；自動化智能制芯中心；殼型、精密組芯造

technology and equipment for external heat blast cupolas; large die-casting machines (with clamping force of 3,500 tons or above); automatic intelligent core making centers; shell-mold casting, precision core package molding, silica sol investment casting, die casting, semi-solid metal casting, squeeze casting, counter-pressure casting, adjusted pressure casting, and other special casting technology and equipment; 3D printing and sand mold cutting and rapid prototyping technology and equipment applied in casting; automatic pouring machine; technology and equipment for online casting testing; complete automatic equipment for efficient casting cleaning; and manufacture and application of special robots used for casting	型、矽溶膠熔模、壓鑄、半固態、擠壓、差壓、調壓等特殊鑄造技術與裝備；應用於鑄造生產的3D打印和砂型切削快速成型技術與裝備；自動澆注機；鑄件在線檢測技術與裝備；鑄件高效自動化清理成套設備；鑄造專用機器人的製造與應用
25. Application of technologies of reclamation and reuse of casting resin sand and clay sand, among others; and application of environmental protection resin, inorganic binder molding and core making technology	25、鑄造用樹脂砂、粘土砂等幹（熱）法再生回用技術應用；環保樹脂、無機粘結劑造型和制芯技術的應用
26. High-speed precision presses (180 to 2,500 kN, and 2,000 to 750 beats/min), ferrous metal hydraulic extruders (150 mm/sec or more), light alloy hydraulic extruders (10 mm/sec or less), high-speed precision shearing machines (2,000 kN or more, 70 to 80 beats/min, and with cross slope of less than 1.50), internal high-pressure molding machines (10,000 kN or more), large bending machines (60,000 kN or more), digital sheet metal processing centers (flexible manufacturing centers/flexible manufacturing systems), high-speed power spinning machines (radial rotation pressure per round: 1,000 kN, axial rotation pressure per round: 800 kN, spindle torque: 240 kN/m, maximum spindle speed: 95 rev/min), numerically-controlled multi-station punching machines (replaced by servo multi-station presses), large nominal pressure cold/warm forging presses (with effective nominal pressure stroke of 25 mm or more and nominal pressure of 10,000 kN or more), and automatically warm/hot forging presses with four or more stations (with nominal pressure of 16,000 kN or more); servo multi-station presses (12,000 to 30,000 kN), large servo presses (8,000 to 25,000kN), progressive die presses (6,000 to 16,000kN), compound driven hot forming presses (nominal pressure ≥12,000 kN, symmetry linkage for force amplification, stroke number of 14 to 18 strokes per minute, slide stroke of 1,100 mm, slide adjustment of 500 mm, maximum downward speed of 1,000mm per second, maximum return speed of 1,000mm per second, and force amplification coefficient of the linkage ≥6), high-speed compound driven presses and intelligent press lines (nominal pressure ≥30,600 kN, compound fuel cylinder driven symmetry linkage for force amplification, single machine continuous stroke number ≥12 times per minute, production line beats of 6-8 beats per minute), research and development and manufacturing of new-generation intelligent complete equipment for the comprehensive stretch-forming of aircraft skin (ultimate tensile strength ≥15 MN, sheet thickness ≥10 mm, jaw opening ≥80mm, jaw limit load (ultimate tensile strength per unit width) ≥63 kN/mm, synchronous accuracy of main cylinder stretching position of ± 0.5 mm, and extension control accuracy ≥0.2%); perfusion forming techniques and equipment for large and super-large aerospace sheet metal parts (manufacturing technology for the integral intake lips of high-bypass-ratio engines): (nominal pressure of 200 MN, stretching tonnage of 16,000 tons, edge pressing tonnage of 4,000 tons, slide stroke of 3,000 mm, the size of the worktable of 5,000 mm × 5,000 mm, the pressure of the liquid chamber of 10 MPa, the volume of the liquid chamber of 6,000 L, and displacement of 4,300L); radial forging machines (precision forging machine) and rotary forging machines (630 to 22,000 kN); and pulsating extruders (vibration extruders) (630 to 22,000 kN), and high-speed upsetters (100 pieces per minute, and weight of a forged part of 1.6 kg or more)	26、高速精密壓力機（180～2500kN，2000～750次/分鐘）、黑色金屬液壓擠壓機（150毫米/秒以上）、輕合金液壓擠壓機（10毫米/秒以下）、高速精密剪切機（2000kN以上，70～80次/分鐘，斷面斜度1.5°以下）、內高壓成形機（10000kN以上）、大型折彎機（60000kN以上）、數字化鋁金加工中心（柔性制造中心/柔性制造系統）、高速強力旋壓機（徑向旋壓力/每輪：1000kN，軸向旋壓力/每輪：800kN，主軸轉矩：240kN.m，主軸最高轉速：95轉/分鐘）、數控多工位沖壓機（替換為伺服多工位壓力機）、大公稱壓力冷/溫鍛壓力機（有效公稱力行程25mm以上，公稱力10000kN以上）、4工位以上自動溫/熱鍛造壓力機（公稱力16000kN以上）；伺服多工位壓力機（12000～30000kN）、大型伺服壓力機（8000～25000kN）、級進模壓力機（6000～16000kN）、複合驅動熱成型壓力機（公稱力？12000kN，對稱連杆增力機構，行程次數14～18次/分鐘，滑塊行程1100mm，滑塊調節量500mm，下行最大速度1000mm/s，回程最大速度1000mm/s，連杆增力系數≥6）、高速複合傳動壓力機智能化沖壓線（公稱力？30600kN，複合油缸驅動對稱連杆增力機構，單機連續行程次數≥12次/分鐘，生產線節拍6～8件/分鐘）、新一代飛機蒙皮綜合拉形智能化成套裝備研發與制造（最大拉伸力≥15MN，板料厚度≥10mm，鉗口最大開口度？80mm，鉗口極限負載系數（單位寬度最大拉伸力）？63kN/mm，主缸拉伸位置同步精度±0.5mm，延伸量控制精度≥0.2%）；航空航天大型及超大型鋁金零件充液成形工藝及裝備（大涵道比發動機進氣道整體唇口制造技術）：（設備公稱力200MN，拉深噸位16000T，壓邊噸位4000T，滑塊行程3000mm，工作台面尺寸5000mm×5000mm，液室壓力10MPa，液室容積6000L，排水量4300L）；徑向鍛造機（精鍛機）和旋鍛機（630～22000kN）；脈動擠壓機（振動擠壓機）（630～22000kN），高速鍛鍛機（100件/分鐘，鍛件重量1.6kg以上）
27. Cracked gas compressors, propylene compressors, and ethylene compressors, 400,000-ton (polypropylene, among others) extrusion granulation units, 500,000-ton synthesis gas, ammonia, and oxygen compressors, and other key equipment	27、乙烯裂解三機，40萬噸級（聚丙烯等）擠壓造粒機組，50萬噸級合成氣、氨、氧壓縮機等關鍵設備
28. Large wind power generation seals (with a service life of seven years or more and a working temperature from -45 to 100); nuclear main pump mechanical seals (applicable pressure ≥ 17 MPa and working temperature from 26.7 to 73.9); shield machine main bearing seals (with a service life of 5,000 hours); rotating seals for automobile power train systems and transmission systems; oil well drilling and logging equipment seals (applicable pressure ≥ 105 MPa); hydraulic support seals; high PV value rotary dynamic seals; mechanical seals with oversized diameter (≥ 2 m); seals for aerospace use (working temperature from -54 to 275 and line speed ≥ 150 m/s); high-pressure seals for hydraulic components (applicable pressure	28、大型風力發電密封件（使用壽命7年以上，工作溫度-45℃～100℃）；核電站主泵機械密封（適用壓力≥17兆帕，工作溫度26.7℃～73.9℃）；盾構機主軸承密封（使用壽命5000小時）；轎車動力總成系統以及傳動系統旋轉密封；石油鑽井、測井設備密封（適用壓力≥105兆帕）；液壓支架密封件；高PV值旋轉動密封件；超大直徑（≥2米）機械密封；航天用密封件（工作溫度-54℃～275℃，線速度≥150米/秒）；高壓液壓元件密封件（適

≥ 31.5 MPa); high-precision hydraulic castings (runner size precision ≥ 0.25 mm and fatigue performance test ≥ 2 million times)

29. High-performance non-asbestos sealing materials (with a heat-resistant temperature of 500 and a tensile strength ≥ 20 MPa); high-performance carbon graphite sealing materials (with a heat-resistant temperature of 350 and a compressive strength ≥ 270 MPa); high-performance pressureless sintered silicon carbide materials (with a flexural strength ≥ 200 MPa and a thermal conductivity ≥ 130 W/mK)

30. Intelligent welding equipment; laser welding and cutting, electron beam welding, and other high-energy beam welding and cutting equipment; friction stir, composite heat sources, and other welding equipment; and digital and large capacity inverter welding power sources

31. Large dies (lower plate half cycle length of the stamping die > 2,500 mm, and lower plate half cycle length of the cavity die > 1,400 mm), precision dies (precision of stamping dies ≥ 0.02 mm and precision of cavity dies ≥ 0.05 mm), multi-station automatic deep stretching dies, and multi-station automatic fine blanking dies

32. Large (with a furnace capacity of one ton or more) multifunctional controlled atmosphere heat treatment equipment, program-controlled chemical heat treatment equipment, program-controlled multifunctional vacuum heat treatment equipment and vacuum heat treatment equipment with a furnace capacity of 500 kg or more, and heat treatment heating furnaces with full fiber lining

33. High-strength alloy **steel**, stainless **steel**, and weathering **steel** fasteners, titanium alloy and aluminum alloy fasteners, and precision fasteners; springs for aviation, aerospace, high-speed rail, and engines, among others; high-precision transmission junction pieces, and coupling shaft for heavy mills; new types of powder metallurgical parts: high-density (≥ 7.0 g/cc), high-precision, and complex-shaped structural parts; friction devices for high-speed trains and airplanes; oil bearings; speed-changing gearboxes for China Railway High-Speed(CRH) trains, gear transmission agents with adjustable blades used for vessels, gearboxes used for wind power of 2.0 megawatts and above, and gearboxes for metallurgical and mining machinery; automobile powertrain, engineering machinery, and chains used for large agricultural machinery; and basic supporting parts of major equipment and key projects

34. Sea water desalting equipment

35. Robots and integrated systems: special service robots, medical rehabilitation robots, public service robots, personal service robots, human-machine collaboration robots, dual-arm robots, arc welding robots, heavy-duty AGVs, and special testing and assembly robot integration systems, among others. Key parts for robots: high-precision speed reducers, high-performance servo motors and drives, fully autonomous programming and other high-performance controllers, sensors, and end effectors. Common robotic technology: inspection, testing and assessment certification, intelligent robot operating systems, and intelligent robot cloud service platforms

36. Integrated excavation equipment for a mine or a thin seam with an annual yield of five million tons or more and key equipment for a large-scale surface mine with an annual yield of 10 million tons or more

37. Integrated compressor units of 18MW or above, supporting compressors, gas turbines, valves, and other key equipment for natural gas transmission lines with a diameter of 1,200 mm or above; supporting compressors, driven machinery, and cryogenic equipment, among others, for liquefaction of natural gas with an annual yield of 2.6 million tons or more per line; supporting oil pumps of 3,000 cubic meters or more per hour and other key equipment for large-scale oil pipelines

38. Sheet-fed and multi-color offset presses (width ≥ 750 mm; printing speed: single-sided and multicolor ≥ 16,000 sheets/hour, and two-sided and multicolor ≥ 13,000 sheets/hour); commercial web offset presses (width ≥ 787 mm, printing speed ≥ 7 m/s, and overprinter precision ≥ 0.1 mm); newspaper web offset presses (printing speed: single-paper path and single-width machine ≥ 75,000 sheets/hour, double-paper path and double-width machine ≥

用壓力≥31.5兆帕) ; 高精密液壓鑄件(流道尺寸精度≥0.25毫米, 疲勞性能測試≥200萬次)

29、高性能無石棉密封材料(耐熱溫度500℃, 抗拉強度≥20兆帕); 高性能碳石墨密封材料(耐熱溫度350℃, 抗壓強度≥270兆帕); 高性能無壓燒結碳化矽材料(彎曲強度≥200兆帕, 熱導率≥130瓦/米·開爾文(W/m·K))

30、智能焊接設備, 激光焊接和切割、電子束焊接等高能束流焊割設備, 攪拌摩擦、複合熱源等焊接設備, 數字化、大容量逆變焊接電源

31、大型模具(下底板半周長度沖壓模>2500毫米, 下底板半周長度型腔模>1400毫米)、精密模具(沖壓模精度≥0.02毫米, 型腔模精度≥0.05毫米)、多工位自動深拉伸模具、多工位自動精沖模具

32、大型(裝爐量1噸以上)多功能可控氣氛熱處理設備、程控化學熱處理設備、程控多功能真空熱處理設備及裝爐量500公斤以上真空熱處理設備、全纖維爐襯熱處理加熱爐

33、合金鋼、不鏽鋼、耐候鋼高強度緊固件、鈦合金、鋁合金緊固件和精密緊固件; 航空、航天、高鐵、發動機等用彈簧; 高精度傳動聯結件, 大型軋機聯結軸; 新型粉末冶金零件: 高密度(≥7.0克/立方厘米)、高精度、形狀複雜結構件; 高速列車、飛機摩擦裝置; 含油軸承; 動車組用齒輪變速箱, 船用可變槳齒輪傳動系統、2.0兆瓦以上風電用變速箱、冶金礦山機械用變速箱; 汽車動力總成、工程機械、大型農機用鏈條; 重大裝備和重點工程配套基礎零部件

34、海水淡化設備

35、機器人及集成系統: 特種服務機器人、醫療康復機器人、公共服務機器人、個人服務機器人、人機協作機器人、雙臂機器人、弧焊機器人、重載AGV、專用檢測與裝配機器人集成系統等。機器人用關鍵零部件: 高精密減速器、高性能伺服電機和驅動器、全自主編程等高性能控制器、傳感器、末端執行器等。機器人共性技術: 檢驗檢測與評定認證、智能機器人操作系統、智能機器人雲服務平台

36、500萬噸/年及以上礦井、薄煤層綜合采掘設備, 1000萬噸級/年及以上大型露天礦開鑿裝備

37、18MW及以上集成式壓縮機組、直徑1200毫米及以上的天然氣輸氣管線配套壓縮機、燃氣輪機、閘門等關鍵設備; 單線260萬噸/年及以上天然氣液化配套的壓縮機及驅動機械、低溫設備等; 大型輸油管線配套的3000立方厘米/小時及以上輸油泵等關鍵設備

38、單張紙多色膠印機(幅寬≥750毫米, 印刷速度: 單面多色≥16000張/小時, 雙面多色≥13000張/小時); 商業卷筒紙膠印機(幅寬≥787毫米, 印刷速度≥7米/秒, 套印精度≥0.1毫米); 報紙卷筒紙膠印機(印刷速度: 單紙路單幅機≥75000張/小時, 雙紙路雙幅機≥150000張/小

150,000 sheets/hour, and overprinter precision ? 0.1 mm); multicolor wide flexographic presses (printing width ? 1,300 mm and printing speed ? 400 m/min); unit flexographic presses (printing speed ? 250 m/min); environment-friendly multicolor web photogravure presses (printing speed ? 300 m/min and overprinter precision ? 0.1 mm); inkjet digital presses (used for publication: printing speed ? 150 m/min and resolution ? 600 dpi; used for packaging: printing speed ? 30 m/min and resolution ? 1,000 dpi; used for variable data: printing speed ? 100 m/min and resolution ? 300 dpi); computer-to-plate (1000dpi) (imaging speed ? 35 sheets/hour, plate width ? 750 mm, repeatability of 0.01 mm, and resolution of 3,000 dpi); and shaftless numerically-controlled platen hot stamping machines (stamping speed ? 10,000 sheets/hour and machining precision of 0.05 mm)

39. Two- or four-wheel drive wheeled tractors and crawler tractors of 100 horsepower or above and equipped with a power shift transmission or continuously variable transmission, a bus control system, a safety cab, a power output shaft with two or more rotate speed, and hydraulic output points of not less than three groups Intertillage tractors, tractors used for orchards, and high-clearance (minimum terrain clearance of 40 cm or more) tractors, with matched power of 50 horsepower or above

40. Supporting farm machinery of tractors of 100 horsepower or above: subsoilers, combined soil preparation machines, and combined machines for soil preparation and sowing, among others, required for conservation tillage and moldboard plows with a width of share ? 40 cm, round disc harrows, grain drills, precision planters for cultivated crops, cultivators, non-tillage planters, and large sprayers (dusters), among others, required for conventional agricultural operations

41. Key parts and components of tractors of 100 horsepower or above: power shift transmissions, hydraulic mechanical continuously variable transmissions, integrated pump motors, front drive axles with rim brakes and limited slip differential locks used for wheeled tractors, anti-lock braking systems, batteries, motors and control systems of electric tractors, clutches, hydraulic pumps, hydraulic cylinders, various valves and hydraulic delivery valves, and other closed hydraulic systems; closed-core and load-sensing electronically-controlled hydraulic lifters, rims, spokes, and hydraulic steering mechanism, among others

42. Crop transplanting machines: ride-on plate-soil motor high-speed rice transplanters (350 times or more per minute, 3 to 5 plants per hole, applicable line spacing of 20 to 30 cm, adjustable row spacing, and applicable row spacing of 12 to 22 cm); and plate-soil motor rice seedling transplanters (ride-on or walk-behind, applicable line spacing of 20 to 30 cm, adjustable row spacing, and applicable row spacing of 12 to 22 cm), among others

43. Agricultural harvesting machinery: self-propelled grain combine harvesters (feed rate of 6 kg/sec or more); self-propelled semi-feed rice combine harvesters (four lines or more and a supporting engine of 44 kilowatts or more); self-propelled corn combine harvesters (three to six lines, snapping type, and with a peeling device and a device of crushing stalks and returning them to field or a device of chopping and collecting stalks); ear, stalk and corn harvester (ear snapping and peeling as well as stalk shredding and recovery), self-propelled corn grain combine harvester (four lines or more, direct grain harvesting type); self-propelled harvesters of silages such as barley, grass alfalfa, corn, and sorghum (with matched power of 147 kilowatts or more, a length of chopped stems of 10 to 60 mm, and a device to detect metal and stone and the functionality of grain grinding); cotton picking machines (three lines or more, self-propelled or tractor backpack, cotton picking device of a mechanical or pneumatic style, an applicable height of cotton plant from 35 to 160 cm, with seed cotton containers and an automatic cotton unloading device); potato harvesters (self-propelled or tractor-drawn, two lines or more, adjustable line spacing, with a soil-removing device and a collection device, and a maximum digging depth of 35 cm); sugarcane harvesters (self-propelled or tractor knapsack, with matched power of 58 kilowatts or more, a perennial root broken rate ? 18%, and a loss rate ? 7%); combined operation machine for residual film recovery and stalk crushing; hay harvesting machinery (self-propelled hay harvesters, pull-type mower-conditioners, wheel hay rakes, and hay balers, among others); self-propelled potato harvesters; hybrid paper mulberry combine harvesting machines

時, 套印精度?0.1毫米); 多色寬幅柔性版印刷機 (印刷寬度?1300毫米, 印刷速度?400米/分鐘); 機組式柔性版印刷機 (印刷速度?250米/分鐘); 環保多色卷筒料凹版印刷機 (印刷速度?300米/分鐘, 套印精度?0.1毫米); 噴墨數字印刷機 (出版用: 印刷速度?150米/分鐘, 分辨率?600dpi; 包裝用: 印刷速度?30米/分, 分辨率?1000dpi; 可變數據用: 印刷速度?100米/分鐘, 分辨率?300dpi); CTP直接制版機 (成像速度?35張/小時, 版材幅寬?750毫米, 重複精度0.01毫米, 分辨率?3000dpi); 無軸數控平壓平燙印機 (燙印速度?10000張/小時, 加工精度0.05毫米)

39、100馬力以上、配備有動力換擋變速箱或無級變速箱、總線控制系統、安全駕駛室、動力輸出軸有2個以上轉速、液壓輸出點不少于3組的兩輪或四輪驅動的輪式拖拉機、履帶式拖拉機。配套動力50馬力以上的中耕型拖拉機、果園用拖拉機、高地隙拖拉機 (最低離地高度40厘米以上)

40、100馬力以上拖拉機配套農機具: 保護性耕作所需要的深松機、聯合整地機和整地播種聯合作業機等, 常規農業作業所需要的單體幅寬?40厘米的鐮式犁、圓盤耙、谷物條播機、中耕作物精密播種機、中耕機、免耕播種機、大型噴霧 (噴粉) 機等

41、100馬力以上拖拉機關鍵零部件: 動力換擋變速箱, 液壓機械無級變速箱、一體式泵馬達、輪式拖拉機用帶輪邊制動和限滑式差速鎖的前驅動橋, ABS制動系統, 電動拖拉機電池、電機及其控制系統, 離合器, 液壓泵、液壓油缸、各種閥及液壓輸出閥等封閉式液壓系統, 閉心變量、負載傳感的電控液壓提升器, 電控系統, 液壓轉向機構等

42、農作物移栽機械: 乘坐式盤土機動高速水稻插秧機 (每分鐘插次350次以上, 每穴3~5株, 適應行距20~30厘米, 株距可調, 適應株距12~22厘米); 盤土式機動水稻擺秧機 (乘坐式或手扶式, 適應行距為20~30厘米, 株距可調, 適應株距為12~22厘米) 等

43、農業收穫機械: 自走式谷物聯合收割機 (喂入量6千克/秒以上); 自走式半喂入水稻聯合收割機 (4行以上, 配套發動機44千瓦以上); 自走式玉米聯合收割機 (3~6行, 摘穗型, 帶有剝皮裝置, 以及莖稈粉渣還田裝置或莖稈切碎收集裝置); 穗莖兼收玉米收穫機 (摘穗剝皮、莖稈切碎回收), 自走式玉米籽粒聯合收穫機 (4行以上, 籽粒直收型); 自走式大麥、草苜蓿、玉米、高粱等青貯飼料收穫機 (配套動力147千瓦以上, 莖稈切碎長度10~60毫米, "具有金屬探測、石塊探測安全裝置及籽粒破碎功能"); 棉花採摘機 (3行以上, 自走式或拖拉機背負式, 摘花裝置為機械式或氣力式, 適應棉株高度35~160厘米, 裝有籽棉集裝箱和自動卸棉裝置); 馬鈴薯收穫機 (自走式或拖拉機牽引式, 2行以上, 行距可調, 帶有去土裝置和收集裝置, 最大挖掘深度35厘米), 甘蔗收穫機 (自走式或拖拉機背負式, 配套功率58千瓦以上, 宿根破碎率?18%, 損失率?7%); 殘膜回收與莖稈粉碎聯合作業機; 牧草收穫機械 (自走式牧草收割機、懸掛式割草壓扁機、指盤式牧草攪草機、牧草撿拾壓捆機等); 自走式薯類收穫機械; 雜交構樹聯合收穫機械

44. Water-saving irrigation equipment: all kinds of large and medium irrigation machines, and various types of micro-drip irrigation equipment, among others; flood control and drainage equipment (with displacement of 1,500 cubic meters/hour or more, lift of 5 to 20 meters, power of 1,500 kW or above, efficiency of 60% or above, and removable)

45. Biogas generation equipment: integration of biogas fermentation and storage (series of products with biogas storage capacity of 300 to 2,000 cubic meters) and equipment of pumping slag from biogas slurry (a pumping capacity of one cubic meter or more per minute), among others

46. Large construction machinery: hydraulic excavators of 30 tons or above, tunnel boring machines (TBM) of six meters or above, crawler dozers of 320 horsepower or above, loaders of six tons or above, bridging equipment of 600 tons or above (including bridge girder erection machines, girder transporting vehicles, and girder cranes), crawler cranes of 400 tons or above, all-terrain cranes of 100 tons or above, reach stackers of 25 tons or above, tower cranes of 1,000 tons/m or above, drill jumbos with a drill hole of 100 mm or above, planers one meter wide or above, mining vehicles of 75 tons or above, graders of 220 horsepower or above, vibratory hydraulic rollers of 18 tons or above, pavers of nine meters or above, planers of one meter or above, container handlers of 20 tons or above, diesel forklift trucks of eight tons or above, electric forklift trucks of three tons or above, concrete pumps of 40 meters or above, concrete mixer trucks of eight cubic meters or above, concrete mixing stations of 90 cubic meters/hour or above, concrete cold and hot recycling equipment of 400 kilowatts or above, rotary drilling rigs of 2,000 mm or above, slurry wall excavation equipment of 400 mm or above; and key components: power shift transmissions, wet drive axles, slewing bearings, torque converters, and supporting electric machines, electronic control, hydraulic motors with pressure of 25 MPa or more, pumps, and control valves for electric forklifts

47. Intelligent logistics and warehousing equipment, information systems, intelligent material handling equipment, intelligent port handling equipment, and intelligent logistics equipment for agricultural products among others

48. Combustion engines with high reliability, low emissions and low power used for non-road mobile machinery: life indicators: 8,000 to 12,000 hours for heavy type, 5,000 to 7,000 hours for medium type, and 3,000 to 4,000 hours for light type, emission indicators: meeting the requirements of emission indicators in Euro IIIB, Euro IV, Euro V, China III, and China IV; and the fuel system, pressurization system, and exhaust aftertreatment system (all including electronic control system) affecting the power, economic, and environmental protection performances of combustion engines used for non-road mobile machinery

49. Refrigeration and air-conditioning equipment and key components: heat pumps, composite heat source (air source and solar) heat pump water heaters, refrigeration and air-conditioning compressors with energy efficiency of level 2 or above, micro-channel and falling film heat transfer technologies and equipment, electronic expansion valves, and two-phase flow ejectors and their key components; and refrigeration and air-conditioning compressors using environment-friendly refrigerants (ODP is 0 and GWP value is lower)

50. Complete drilling machines such as deep drilling rigs with a depth of 12,000 m or more, polar drilling rigs, high displacement deep-well and desert drilling rigs, drilling rigs used in swamp areas difficult to enter, offshore rigs, truck-mounted drilling rigs, and drilling rigs used for special drilling techniques

51. Centralized processing equipment for hazardous waste (including medical waste)

52. Large efficient two-plate injection molding machines (with a mold clamping force of 1,000 tons or more), all-electric plastic injection molding machines (with an injection volume of less than 1,000 g), energy-saving plastics and rubber injection molding machines (with energy consumption of less than 0.4 kwh/kg), high-speed energy-saving plastic extrusion units (production capacity: 30 to 3,000 kg/hour, and energy consumption: less than 0.35 kwh/kg), microcellular foam plastic injection molding machines (mold clamping force: 60 to 1,000 tons, injection volume: 30 to 5,000 g, and energy consumption of less than 0.4 kwh/kg), large

44、節水灌溉設備：各種大中型噴灌機、各種類型微滴灌設備等；抗洪排澇設備（排水量1500立方米/小時以上，揚程5～20米，功率1500千瓦以上，效率60%以上，可移動）

45、沼氣發生設備：沼氣發酵及儲氣一體化（儲氣容積300～2000立方米系列產品）、沼液抽渣設備（抽吸量1立方米/分鐘以上）等

46、大型施工機械：30噸以上液壓挖掘機、6米及以上全斷面掘進機、320馬力及以上履帶推土機、6噸及以上裝載機、600噸及以上架橋設備（含架橋機、運梁車、提梁機）、400噸及以上履帶起重機、100噸及以上全地面起重機、25噸及以上集裝箱正面吊、1000噸/米及以上塔式起重機、鑽孔100毫米以上鑿岩台車、1米寬及以上銑刨機、75噸及以上礦用車、220馬力及以上平地機、18噸及以上振動液壓式壓路機、9米及以上攤鋪機、1米及以上銑刨機、20噸及以上集裝箱叉車、8噸及以上內燃叉車、3噸及以上電瓶叉車、40米及以上?泵車、8立方米及以上?攪拌車、90立方米/時及以上?攪拌站、400千瓦及以上?冷熱再生設備、2000毫米及以上旋挖鑽機、400毫米及以上地下連續牆開挖設備；關鍵零部件：動力換擋變速箱、濕式驅動橋、回轉支承、液力變矩器、為電動叉車配套的電機、電控、壓力25兆帕以上液壓馬達、泵、控制閥

47、智能物流與倉儲裝備、信息系統，智能物料搬運裝備，智能港口裝卸設備，農產品智能物流裝備等

48、非道路移動機械用高可靠性、低排放、低能耗的內燃機：壽命指標（重型8000～12000小時，中型5000～7000小時，輕型3000～4000小時）、排放指標（符合歐IIIB、歐IV、歐V、國三、國四排放指標要求）；影響非道路移動機械用內燃機動力性、經濟性、環保性的燃油系統、增壓系統、排氣後處理系統（均包括電子控制系統）

49、制冷空調設備及關鍵零部件：熱泵、複合熱源（空氣源與太陽能）熱泵熱水機、二級能效及以上制冷空調壓縮機、微通道和降膜換熱技術與設備、電子膨脹閥和兩相流噴射器及其關鍵零部件；使用環保制冷劑（ODP為0、GWP值較低）的制冷空調壓縮機

50、12000米及以上深井鑽機、極地鑽機、高位移性深井沙漠鑽機、沼澤難進入區域用鑽機、海洋鑽機、車裝鑽機、特種鑽井工藝用鑽機等鑽機成套設備

51、危險廢物（含醫療廢物）集中處理設備

52、大型高效二板注塑機（合模力1000噸以上）、全電動塑料注射成型機（注射量1000克以下）、節能型塑料橡膠注射成型機（能耗0.4千瓦時/千克以下）、高速節能塑料擠出機組（生產能力30～3000公斤/小時，能耗0.35千瓦時/千克以下）、微孔發泡塑料注射成型機（合模力60～1000噸，注射量30～5000克，能耗0.4千瓦時/千克以下）、大型雙螺杆擠出造粒機組（生產能力30～60萬噸/

twin-screw extrusion granulation units (production capacity: 300,000 to 600,000 tons/year), large para-aramid reactive extrusion units (production capacity of 14,000 tons/year or above), carbon fiber pre-impregnated units (a production capacity of 600,000 m/year or above; and a width of 1.2 m or more), and injection molding compounding equipment for fiber reinforced composites (clamping force of 200 to 6,800 tons, and shot weight of 600 to 85,000 grams)

53. Nanofiltration membrane and reverse osmosis membrane pure water equipment

54. Safe drinking water equipment: combined-type integrated water purifiers (with a processing capacity of 100 to 2,500 tons/hour)

55. Air pollution control equipment: desulfurization, denitrification, dust collection, and other ultra-low emission complete technical equipment such as coal-fired generating units; pre-charging bag dust collection technical equipment for fine particles in flue gas from **steel** furnaces and kilns; SDA desulfurization plus SCR denitration technical equipment for coke oven flue gas; alumina defluorination and dust collection technical equipment for electrolytic aluminum flue gas; dry desulfurization and dust collection equipment for **steel** sintering flue gas; bag dust collectors; electric-bag composite dust collection technical equipment (particulate matter emission concentration < 10 mg/m<sup>3</sup>); catalytic cracking regeneration flue gas dust collection and desulfurization technical equipment; VOCs adsorption and recovery devices; VOCs incineration devices; fugitive emission control technical equipment for furnaces, kilns, and stockyards; and cooking fume purification equipment for the catering industry

56. Sewage prevention and control technical equipment: urban sewage treatment outfits (phosphorus and nitrogen removal); sludge hydrolysis and anaerobic digestion technical equipment; sludge drying and incineration technical equipment (slag removal quantity of 90% or above); immersed membrane bioreactors (COD removal efficiency of 90 % or more); ceramic vacuum filters (vacuum degree: 0.09 to 0.098 MPa, and porosity: 0.2 microns to 20 microns); technical equipment for the treatment of high concentration organic wastewater by ultrasonic coupling and biofilm processes; and oily sewage and chemical tank cleaning water treatment technical equipment

57. Solid waste prevention and control technical equipment: domestic garbage clean incineration technical equipment (with the amount of combustion-supporting coal of less than 20%); technical equipment for concentrated decontamination of kitchen waste (with a utilization rate of 95%); technical equipment for landfill leachate and odor treatment (with a handling capacity of 50 tons/day or above); technical equipment for domestic garbage automated sorting (with a sorting rate of 80% or more); construction waste treatment and recycling technical equipment (with a handling capacity of 100 tons/hour or more); technical equipment for industrial hazardous waste disposal and treatment (with a treatment rate of 90% or more); technologies and outfits for oilfield drilling waste disposal and treatment (with a volume reduction of 50% or more and a treatment rate of 70% or more); and technical equipment for medical waste clean incineration and thermophilic digestion decontamination (with a handling capacity of 150 kg/hour or more and combustion efficiency of 70% or more) and microwave and chemical disinfection treatment technical equipment for medical wastes; and centralized treatment technical equipment for livestock and poultry manure (a processing capacity of more than 20 tons/day)

58. Soil remediation technical equipment: integrated crushing and screening machine, odor suppression equipment, direct thermal desorption equipment, indirect thermal desorption equipment, soil leaching equipment, soil improvement machine, and direct push drilling and sampling equipment

59. Underground scalers, raise boring rigs, multi-functional crushing and block-clearing machines, dual-system brake and hydrostatic four-wheel drive underground multi-functional service vehicles, mining portable gas detectors, technology for underground curtain grouting near ore body, underground mining electric locomotive remote control technology, paste and high-concentration tailings backfill technology and equipment, and boxhole boring machines

年)、大型對位芳綸反應擠出機組 (生產能力1.4萬噸/年以上)、碳纖維預浸膠機組 (生產能力60萬米/年以上; 幅寬1.2米以上)、纖維增強複合材料在線混煉注塑成型設備 (合模力200~6800噸, 注射量600~85000克)

53、納濾膜和反滲透膜純水裝備

54、安全飲水設備: 組合式一體化淨水器 (處理量100~2500噸/小時)

55、大氣汙染治理裝備: 燃煤發電機組脫硫、脫硝、除塵等超低排放成套技術裝備; 鋼鐵爐窯煙氣細顆粒物預荷電袋式除塵技術裝備; 焦爐煙氣SDA脫硫+SCR脫硝技術裝備; 電解鋁煙氣氧化鋁脫氟除塵技術裝備; 鋼鐵燒結煙氣幹法脫硫除塵成套裝備; 袋式除塵器; 電袋複合除塵技術裝備 (顆粒物排放濃度<10毫克/立方米); 催化裂化再生煙氣除塵脫硫技術裝備; VOCs吸附回收裝置; VOCs焚燒裝置; 爐窯、料場的無組織排放控制技術裝備; 飲食業油煙淨化設備

56、汙水防治技術設備: 城鎮汙水處理成套裝備 (除磷脫氮); 汙泥水解厭氧消化技術裝備; 汙泥乾燥焚燒技術裝備 (減渣量90%以上); 浸沒式膜生物反應器 (COD去除率90%以上); 陶瓷真空過濾機 (真空度: 0.09~0.098兆帕, 孔隙: 0.2微米~20微米); 超生耦合法和生物膜法處理高濃度有機廢水技術裝備; 油汙水、化學品洗滌水處理技術裝備

57、固體廢物防治技術設備: 生活垃圾清潔焚燒技術裝備 (助燃煤量20%以下); 廚余垃圾集中無害化處理技術裝備 (利用率95%以上); 垃圾填埋滲濾液和臭氣處理技術裝備 (處理量50噸/天以上); 生活垃圾自動化分選技術裝備 (分選率80%以上); 建築垃圾處理和再利用工藝技術裝備 (處理量100噸/小時以上); 工業危險廢棄物處置處理技術裝備 (處理率90%以上); 油田鑽井廢棄物處理處置技術與成套裝備 (減容50%以上, 處理率70%以上); 醫療廢物清潔焚燒、高溫蒸煮無害化處理技術裝備 (處理量150千克/小時以上, 燃燒效率70%以上) 以及醫療廢物微波、化學消毒處理技術裝備; 畜禽糞汙集中處理技術裝備 (處理量20噸/天以上)

58、土壤修復技術裝備: 破碎篩分一體機、氣味抑制設備、直接熱解吸設備、間接熱解吸設備、土壤淋洗設備、土壤改良機、直推式鑽探與採樣設備

59、攪毛台車、天井鑽機鑽、多功能破碎清塞機、雙系統制動靜液壓四驅地下礦用多功能服務車、礦用便攜式氣體檢測儀、井下近礦體帷幕注漿技術、井下電機車遠程操控技術、膏體及高濃度尾礦充填技術與裝備、切割井鑽機

60. Technology development and equipment manufacturing for (ground-source, water-source, air-source, and other) heat pumps
61. Development of technology for and production of power electronic transformers for core equipment for intelligent distribution networks
62. Noise and vibration pollution control equipment: acoustic barriers, mufflers, and spring vibration dampers
63. Equipment and special materials for additive manufacturing
- 60、熱泵（地源、水源、空氣源等）技術開發與裝備制造
- 61、智能配電網核心設備電力電子變壓器技術開發與生產
- 62、噪聲與振動汙染控制設備：聲屏障、消聲器、阻尼彈簧隔振器
- 63、增材制造裝備和專用材料

**XV. Urban Rail Transit Equipment**

1. Application of urban rail transit damping and noise reduction technologies
2. Automatic fare collection systems (AFC) and systems of vehicle doors, platform screen doors, and vehicle couplers, windshield systems, and fire alarm and automatic fire extinguishing systems
3. Wireless communication-based signaling systems [including automatic train supervision system (ATS), automatic train protection (ATP) devices, and automatic train operation (ATO) devices]
4. Railway vehicle alternating current traction drive systems, brake systems, and core components (including IGCT, IGBT, and SiC components), network control systems, permanent-magnet traction motors, DC high-speed switches, gas-insulated switchgear (GIS), and new intelligent switchgear
5. Lightweight application of vehicle body, bogie, gearbox, and interior decoration materials
6. Urban rail train regenerative braking absorption devices, energy feedback, energy storage systems
7. Testing instruments and monitoring systems for rail transit
8. Fully automatic operation (FAO), train autonomous circumambulate system (TACS) based on train-to-train communication, and intelligent operation and maintenance systems
9. Traction power supply systems for urban rail transit (urban rail transit lines based on the 25kV AC traction power supply system)
10. Magnetic levitation trains and rubber wheel rail transit technical equipment

**XVI. Automobiles**

1. Key components of automobiles: gasoline engine turbochargers, eddy current retarders, hydraulic retarder, servo headlamp systems, LED headlamps, digital instrumentation, solenoid valves used for electrical control system actuators, axles exclusively used for large low-floor buses, air suspension, energy-absorbing steering systems, inverter air conditioners for large and medium-sized passenger cars, high-strength **steel** wheels, disc brakes for commercial vehicles, emergency protection devices for tire punctures in commercial vehicles, column type electric power steering ( C-EPS), rack assist type electric power steering (R-EPS), start-stop systems, high-efficiency and high-reliability electromechanical coupling systems; dual-clutch transmissions (DCT), automatic mechanical transmissions (AMT), automatic transmissions with seven speeds or more (AT with seven speeds or more), and continuously variable transmissions (CVT); efficient diesel particulate filters; electronically controlled high-pressure common rail injection systems and its fuel injectors; high-efficiency booster systems (maximum comprehensive efficiency ? 55% ); exhaust gas recirculation systems; and electric braking, electric steering, and their key components
2. Application of lightweight materials: high-strength **steels** (in line with the GB/T 20564 Continuously Cold Rolled High Strength **Steel** Sheet and Strip for Automobile or the GB/T 34566 Hot Stamping **Steel** Sheet and Strip for Automobile), aluminum alloy, magnesium alloys, composite plastics, powder metallurgy, and high-strength composite fibers, among

**十五、城市軌道交通裝備**

- 1、城市軌道交通減震、降噪技術應用
- 2、自動售檢票系統（AFC），車門、站台屏蔽門、車鉤系統、風擋系統，火災報警和自動滅火系統
- 3、以無線通信為基礎的信號系統[含自動列車監控系統（ATS）、列車自動保護裝置（ATP）、自動列車運行裝置（ATO）]
- 4、軌道車輛交流牽引傳動系統、制動系統及核心元器件（含IGCT、IGBT、SiC元器件），網絡控制系統，永磁牽引電機，直流高速開關、真空斷路器（GIS）、新型智能開關器件
- 5、車體、轉向架、齒輪箱及車內裝飾材料輕量化應用
- 6、城軌列車再生制動吸收裝置、能量回饋、能量儲存系統
- 7、軌道交通用檢測試驗儀器和監控系統
- 8、全自動運行系統（FAO），基於車車通信的列車自主運行系統（TACS），智能運維系統
- 9、城市軌道交通牽引供電系統（基於25kV交流牽引供電制式的城軌線路）
- 10、磁懸浮列車，膠輪軌道交通技術裝備

**十六、汽車**

- 1、汽車關鍵零部件：汽油機增壓器、電流流緩速器、液力緩速器、隨動前照燈系統、LED前照燈、數字化儀表、電控系統執行機構用電磁閥、低地板大型客車專用車橋、空氣懸架、吸能式轉向系統、大中型客車變頻空調、高強度鋼車輪、商用車盤式制動器、商用車輪胎爆胎應急防護裝置、轉向軸式電動助力轉向系統（C-EPS）、轉向齒條式電動助力轉向系統（R-EPS）、怠速啟停系統、高效高可靠性機電耦合系統；雙離合器變速器（DCT）、電控機械變速器（AMT）、7擋及以上自動變速器（7擋及以上AT）、無級自動變速器（CVT）；高效柴油發動機顆粒捕捉器；電控高壓共軌噴射系統及其噴油器；高效增壓系統（最高綜合效率?55%）；廢氣再循環系統；電制動、電動轉向及其關鍵零部件
- 2、輕量化材料應用：高強度鋼（符合GB/T 20564《汽車用高強度冷連軋鋼板及鋼帶》標準或GB/T 34566《汽車用熱沖壓鋼板及鋼帶》標準）、鋁合金、鎂合金、複合塑料、粉末冶金、高強度複合纖維等；先進成形技術應用：

others; application of advanced forming technologies: 3D printing forming, expanded application of laser tailor-welded blanks, hydroforming, ultra-high strength steel hot forming (strength ?980MPa, and the product of tensile strength and elongation of 20 to 50GPa%), and flexible roll forming, among others; and application of environment-friendly materials: water-based paints and lead-free solders, among others

3. Key parts and components of new energy vehicles: high-security energy-type power battery cells (energy density ?300Wh/kg, and cycle life ?1800 times); battery anode materials (specific capacity ? 180mAh/g and a cycle life of 2,000 times without lowering than 80% of the initial discharge capacity), battery cathode materials (specific capacity ?500 mAh/g and a cycle life of 2,000 times without lowering than 80% of the initial discharge capacity), battery separators (thickness ?12μm, porosity of 35% -60%, tensile strength MD ?800 kgf/cm<sup>2</sup>, and TD?800 kgf/cm<sup>2</sup>); battery management systems, motor controllers, and electronic control integration of electric vehicles; driving motor systems of electric vehicles (high-efficiency area: 85% and efficiency in working area ? 80%), vehicle DC/DC (input voltage of 100V to 400V), high-power electronic devices (IGBT, voltage class ? 750V, and current ? 300A); and plug-in hybrid electromechanical coupling drive systems; fuel cell engines (power-to-mass ratio ?350 W/kg), fuel cell stacks (power density ?3 kW/L), membrane electrodes (platinum usage ?0.3 g/kW), proton exchange membranes (proton conductivity ?0.08 S/cm), bipolar plates (thickness of metal bipolar plates ?1.2mm and thickness of other bipolar plates?1.6mm), low-platinum catalysts, carbon paper (resistivity ?3 MΩ·cm), air compressors, hydrogen circulation pumps, hydrogen ejectors, humidifiers, fuel cell control systems, boost DC/DC, 70 MPa hydrogen tanks, and on-board hydrogen concentration sensors; heat pump air conditioners for electric vehicles; chips 32-bit or above specially for motor drive control (with not less than two hardware cores, a main frequency of not less than 180 MHz, and hardware encryption, and other functions, whose design meets ASIL C or higher functional safety requirements); integrated electric drive systems (power density ?2.5 kW/kg); and high-speed reducers (maximum input speed ?12,000 rpm and noise<75 dB)

4. On-board chargers (efficiency under full-load output conditions ?95%), bidirectional on-board chargers, and non-on-board charging equipment (output voltage of 250V to 950V and efficiency within voltage range ?88%); and high-power density, high-conversion efficiency, and high-applicability wireless charging and mobile charging technology and equipment as well as fast charging and battery swap facilities

5. Automotive electronic control systems: the engine control unit (ECU), transmission control unit (TCU), anti-lock braking system (ABS), acceleration slip regulation (ASR), electronic stability control (ESC), network bus control, on-board diagnostics (OBD), electronically-controlled intelligent suspensions, electronic parking system, electronic throttle, lane keeping assist systems (LKA), automatic emergency braking systems (AEBS), electric braking systems (EBS), and axle load automatic measurement systems for trucks, among others.

6. Capacity building for the research and development of intelligent vehicles, new energy vehicles and key components, and high-efficiency internal combustion engines

7. Key components and technologies for intelligent vehicles: sensors, on-board chips, central processors, on-board operating systems and information control systems, equipment for the vehicle network communication system, visual recognition systems, high-precision positioning devices, drive-by-wire chassis systems, and smart automotive safety glass; new intelligent terminal modules, multi-core heterogeneous intelligent computing platform technology, all-weather complex traffic scenario high-precision positioning and mapping technology, sensor fusion technology, key technology for wireless vehicle-to-everything communication, and basic cloud control platform technology; new security isolation architecture technology, software and hardware-coordinated attack recognition technology, terminal chip security encryption and application software security protection technology, wireless communication security encryption technology, secure communication, authentication and authorization technology, and data encryption technology; and research and development of the

3D打印成型、激光拼焊板的擴大應用、內高壓成形、超高強度鋼板(強度?980MPa、強塑積20~50GPa%)熱成形、柔性滾壓成形等;環保材料應用:水性塗料、無鉛焊料等

3、新能源汽車關鍵零部件:高安全性能量型動力電池單體(能量密度?300Wh/kg,循環壽命?1800次);電池正極材料(比容量?180mAh/g,循環壽命2000次不低于初始放電容量的80%),電池負極材料(比容量?500mAh/g,循環壽命2000次不低于初始放電容量的80%),電池隔膜(厚度?12μm,孔隙率35%~60%,拉伸強度MD?800kgf/cm<sup>2</sup>,TD?800kgf/cm<sup>2</sup>);電池管理系統,電機控制器,電動汽車電控集成;電動汽車驅動電機系統(高效區:85%工作區效率?80%),車用DC/DC(輸入電壓100V~400V),大功率電子器件(IGBT,電壓等級?750V,電流?300A);插電式混合動力機電耦合驅動系統;燃料電池發動機(質量比功率?350W/kg)、燃料電池堆(體積比功率?3kW/L)、膜電極(鉑用量?0.3g/kW)、質子交換膜(質子電導率?0.08S/cm)、雙極板(金屬雙極板厚度?1.2mm,其他雙極板厚度?1.6mm)、低鉑催化劑、碳紙(電阻率?3MΩ·cm)、空氣壓縮機、氫氣循環泵、氫氣引射器、增濕器、燃料電池控制系統、升壓DC/DC、70MPa氫瓶、車載氫氣濃度傳感器;電動汽車用熱泵空調;電機驅動控制專用32位及以上芯片(不少于2個硬件內核,主頻不低于180MHz,具備硬件加密等功能,芯片設計符合功能安全ASIL C以上要求);一體化電驅動總成(功率密度?2.5kW/kg);高速減速器(最高輸入轉速?12000rpm,噪聲<75dB)

4、車載充電機(滿載輸出工況下效率?95%)、雙向車載充電機、非車載充電設備(輸出電壓250V~950V,電壓範圍內效率?88%);高功率密度、高轉換效率、高適用性無線充電、移動充電技術及裝備,快速充電及換電設施

5、汽車電子控制系統:發動機控制系統(ECU)、變速箱控制系統(TCU)、制動防抱死系統(ABS)、牽引力控制(ASR)、電子穩定控制(ESC)、網絡總線控制、車載故障診斷儀(OBD)、電控智能懸架、電子駐車系統、電子油門、車道保持輔助系統(LKA)、自動緊急制動系統(AEBS)、電控制動系統(EBS)、載貨汽車用軸荷自動測量系統等

6、智能汽車、新能源汽車及關鍵零部件、高效車用內燃機研發能力建設

7、智能汽車關鍵零部件及技術:傳感器、車載芯片、中央處理器、車載操作系統和信息控制系統、車網通信系統設備、視覺識別系統、高精度定位裝置、線控底盤系統、智能車用安全玻璃;新型智能終端模塊、多核異構智能計算平台技術、全天候複雜交通場景高精度定位和地圖技術、傳感器融合感知技術、車用無線通信關鍵技術、基礎雲控平台技術;新型安全隔離架構技術、軟硬件協同攻擊識別技術、終端芯片安全加密和應用軟件安全防護技術、無線通信安全加密技術、安全通訊及認證授權技術、數據加密技術;測試評價體系架構研發,虛擬仿真、實車道路測試等技術和驗證工具,整車級和系統級測試評價方法,測試基礎數據庫建設



architecture of the test and assessment system, virtual reality, real vehicle road testing, and other technology and verification tools, vehicle-level and system-level testing and assessment methods, and establishment of basic databases for testing

**XVII. Vessels**

1. Optimization and upgrading of bulk carriers, oil tankers, and container ships to meet the requirements of environmental protection and safety; and development and construction of ships of types meeting the new international shipbuilding specifications and standards
2. Liquefied natural gas carriers with a capacity of 100,000 cubic meters or more, liquefied petroleum gas vessels with a capacity of 15,000 cubic meters or more, container ships with 10,000 containers or more, car carriers with 5,000 parking spaces or more, luxury ro-ro passenger ships, chemical tankers of IMO Tier II or above, medium and large luxury cruise ships, ro-ro cargo ships with more than 2,000 parking spaces, ro-ro cargo ships with more than 3,000 meters of lanes, LNG bunkering ships, livestock carriers, methanol (ethane) carriers, oil-electric hybrid ships, battery-powered ships and multi-purpose ships, polar cruise ships, polar transport ships, polar multi-purpose ships, polar seismic research vessels, and other high-tech and high value-added ships
3. Large distant fishing and processing vessels, trailing suction hopper dredgers with a capacity of 10,000 cubic meters or more, train ferries, scientific research ships, icebreakers, oceanographic research ships, marine supervision vessels, deck cargo ships, and other special ships as well as their dedicated equipment
4. Small waterplane area twin-hull ships, hydrofoils, ground effect ships, hovercrafts, wave-piercing ships, and other high-performance vessels
5. Self-elevating drilling platforms for a water depth of 120 meters or more, deep drilling ships for a water depth of 1,500 meters or more, semi-submersible drilling platforms for a water depth of 1,500 meters or more, and other mainstream mobile marine drilling platforms (vessels); floating production storage and offloading (FPSO) of 150,000 tons or above, 1,500-meter semi-submersible production platforms, spar platforms (SPAR), tension leg platforms (TLP), LNG-FPSO, marginal field floating production storage units, and other floating production systems; deep-water anchor handling towing supply vessels with horsepower of 10,000, 1,500-meter large lifting pipe-laying vessels, 1,500-meter surveying vessels, high-performance seismic vessels, semi-submersible transport ships of 50,000 tons or above, offshore wind turbine installation vessels, floating storage and regasification units (FSRU), deep-water dynamic positioning crude oil transportation devices, ultra-deep-water marine engineering workboats, large deep-sea breeding equipment, heavy project vessels with a lifting capacity of more than 10,000 tons, natural gas hydrate drilling and mining ship equipment, deep-sea metal minerals exploration and development equipment, island and reef heavy-load construction platforms, offshore oilfield facility dismantling devices and other marine engineering workboats and auxiliary vessels
6. Dynamic positioning systems, FPSO single-point mooring systems, large-scale offshore platform power plants integrated systems, active power and transmission systems, drilling platform lifting systems, underwater oil and gas production systems, and other general and special marine engineering support equipment
7. Development and manufacturing of yachts and supporting industries
8. Intelligent environment-friendly low- and medium-speed marine diesel engines and their key parts and components, large deck machinery, marine boilers, oil-water separators, desalination plants, ballast water treatment systems, shore power technologies and equipment used for vessels, liquefied natural gas marine dual fuel engines, pod propulsions, cycloidal rudder propellers, large efficient pump-jets, high-power medium- and high-voltage generators, marine communication, navigation and automation systems, integrated electric propulsion systems and key equipment, ship exhaust gas treatment devices, waste heat recovery systems, bimetallic valves, large shipboard incinerators, domestic sewage treatment systems, cargo oil systems, and other key supporting marine equipment

**十七、船舶**

- 1、散貨船、油船、集裝箱船適應綠色、環保、安全要求的優化升級，以及滿足國際造船新規範、新標準的船型開發建造
- 2、10萬立方米以上液化天然氣運輸船、1.5萬立方米以上液化石油氣船、萬箱以上集裝箱船、5000車位及以上汽車運輸船、豪華客滾船、IMO II型以上化學品船、大中型豪華郵輪、2000車位以上汽車滾裝船、3000米車道以上的貨物滾裝船、LNG加注船、牲畜運輸船、甲醇（乙烷）運輸船、油電混合動力船、電池驅動船及多用途船、極地郵輪、極地運輸船舶、極地多用途船、極地物探船等高技術、高附加值船舶
- 3、大型遠洋捕撈加工漁船、1萬立方米以上耙吸式挖泥船、火車渡輪、科學考察船、破冰船、海洋調查船、甲板運輸船、海洋監管船等特種船舶及其專用設備
- 4、小水線面雙體船、水翼船、地效應船、氣墊船、穿浪船等高性能船舶
- 5、120米及以上水深自升式鑽井平台、1500米及以上深鑽井船、1500米及以上水深半潛式鑽井平台等主流海洋移動鑽井平台（船舶）；15萬噸及以上浮式生產儲卸裝置（FPSO）、1500米水深半潛式生產平台、立柱式生產平台（SPAR）、張力腿平台（TLP）、LNG-FPSO、邊際油田浮式生產儲油裝置等浮式生產系統；萬馬力水級深水三用工作船、1500米水深大型起重鋪管船、1500米水深工程勘察船、高性能物探船、5萬噸及以上半潛運輸船、海上風車安裝船、浮式儲存及再氣化裝置（FSRU）、深水動力定位原油輸送裝置、超深水海工作業船、深遠海大型養殖裝備、起重能力10000噸以上的重吊船、天然氣水合物鑽采船裝備、海底金屬礦產資源勘探開發裝備、島礁重載建設平台、海上油田設施拆解裝置等海洋工程作業船和輔助船
- 6、動力定位系統、FPSO單點系泊系統、大型海洋平台電站集成系統、主動力及傳動系統、鑽井平台升降系統、水下油氣生產系統等通用和專用海洋工程配套設備
- 7、游艇開發製造及配套產業
- 8、智能環保型船用中低速柴油機及其關鍵零部件、大型甲板機械、船用鍋爐、油水分離機、海水淡化裝置、壓載水處理系統、船舶使用岸電技術及設備、液化天然氣船用雙燃料發動機、吊艙推進器、直翼舵槳推進裝置、大型高效噴水推進裝置、大功率中高壓發電機、船舶通訊導航及自動化系統、綜合電力推進系統及關鍵設備、船舶尾氣處理裝置、余熱回收系統、雙金屬氣閘、大型船用垃圾焚燒爐、生活汙水處理系統、貨油系統等關鍵船用配套設備

9. Seabed mining robots, seabed trenchers and other seabed mineral resource development equipment and deep-sea mining systems, deep sea riser-related supporting systems and equipment, underwater vehicles, robots, and detection and observation equipment

10. Application of precision management control, digital shipbuilding, unit assembly, advanced outfitting and modularization, advanced coating, and efficient welding technologies, ultra-high pressure water descaling devices, laser welding robots, intelligent segmented assembly lines, ship sub-assembly welding production lines, ship unit-assembly welding stations, intelligent ship block coating robots, ship piping processing production lines, and small hull parts free edge grinding production lines

11. Repair and modification of high-tech and high value-added vessels and marine engineering equipment as well as the application of green and environment-friendly ship repair technologies such as wall climbing robots and intelligent high-pressure cleaning robots

12. Development of intelligent ships and unmanned ships, development of related intelligent systems and equipment, and development of technical equipment for the monitoring of the safe operation of ships throughout their useful life

13. Development and manufacturing of safe, energy saving, and environmental-friendly inland river, river-sea combined transportation, and coastal ships

14. Manufacturing of "cracked connecting rods"

15. Pure electric and natural gas ships; alternative fuel, hybrid, pure electric, fuel cell, and other motor vehicle and ship technologies; and hybrid and plug-in hybrid special engines and optimizing powertrain system matching
- 9、海底采礦機器人、海底挖溝機等海底礦產資源開發裝備及深海采礦系統、深海立管相關配套系統和設備，水下潛器、機器人及探測觀測設備

10、精度管理控制、數字化造船、單元組裝、預裝和模塊化、先進塗裝、高效焊接技術應用、超高壓水除鏽裝置、激光焊接機器人、智能化分段流水線、船舶小組立焊接生產線、船舶中組立焊接工作站、船舶分段智能塗裝機器人、船舶管子加工生產線、船舶船體小構件自由邊打磨生產線

11、高技術高附加值船舶、海洋工程裝備的修理與改裝以及爬壁機器人、高壓智能清洗機器人等綠色環保修船技術應用

12、智能船舶、無人船艇開發和相關智能系統及設備開發，船舶全壽命安全運行監管技術裝備開發

13、安全節能環保內河、江海聯運及沿海船舶開發制造

14、“脹斷連杆”生產制造

15、純電動和天然氣船舶；替代燃料、混合動力、純電動、燃料電池等機動車船技術；混合動力、插電式混合動力專用發動機，優化動力總成系統匹配

**XVIII. Aviation and Aerospace**

1. Development and manufacturing of aircrafts for trunk lines, regional aircrafts, and utility aircrafts and their parts and components

2. Development and manufacturing of aircraft engines

3. Development and manufacturing of airborne equipment, mission equipment, air traffic control equipment, and ground support equipment systems

4. Development and manufacturing of helicopters, rotor systems, and drive systems

5. Development and production of new materials for aviation and aerospace use

6. Manufacturing of gas turbines for aviation and aerospace use

7. Manufacturing of satellites and launch vehicles and their parts and components

8. Application of aviation and aerospace technologies and development and production of system software and hardware products and terminal products

9. Development and manufacturing of aircraft ground-based simulation training systems and test systems

10. Development and manufacturing of aircraft ground repair, maintenance, and testing equipment

11. Satellite ground and application system construction and equipment manufacturing

12. Development and application of emergency rescue equipment exclusively used for aircrafts

13. Repair of aircrafts, equipment, and parts

14. Development and production of advanced satellite payloads

15. Development and manufacturing of unmanned aerial vehicles, materials, communications, and control systems, among others.
- 1、幹線、支線、通用飛機及零部件開發制造

2、航空發動機開發制造

3、機載設備、任務設備、空管設備和地面保障設備系統開發制造

4、直升機總體、旋翼系統、傳動系統開發制造

5、航空航天用新型材料開發生產

6、航空航天用燃氣輪機制造

7、衛星、運載火箭及零部件制造

8、航空、航天技術應用及系統軟硬件產品、終端產品開發生產

9、航空器地面模擬訓練系統、試驗系統開發制造

10、航空器地面維修、維護、檢測設備開發制造

11、衛星地面和應用系統建設及設備制造

12、航空器專用應急救援裝備開發與應用

13、航空器、設備及零件維修

14、先進衛星載荷研制及生產

15、無人機總體、材料、通信、控制系統等開發制造

16. Design of civil aircrafts and helicopters

17. Development and production of solar cells for aerospace

XIX. Light Industry

1. Construction of forest-paper integration production lines each with an annual production capacity of 300,000 tons or more of chemical wood pulp, an annual production capacity of 100,000 tons or more of chemi-mechanical wood pulp, or an annual production capacity of 100,000 tons or more of chemical bamboo pulp, and corresponding paper and paperboard production lines (excluding newsprint and art paper); construction of paper pulp production lines adopting cleaner production techniques and using non-wood fiber as raw materials each with an annual production capacity of 100,000 tons or more; development and manufacturing of advanced pulping and papermaking equipment; and development and application of elemental chlorine free (ECF) totally chlorine free (TCF) chemical pulp bleaching techniques

2. Design and manufacturing of precision molds for metalloid products

3. Development, production, and application of biodegradable plastics and a series of products thereof as well as development and production of agricultural plastic water-saving equipment and functional agricultural films with a long life (three years or more)

4. Production of new plastic building materials (highly airtight and energy-saving plastic windows, large-diameter drainage and sewage pipes, impact-resistant modified PVC pipes, polyethylene pipes used for ground-source heat pump systems, trenchless plastic pipes, composite plastic pipes, and plastic inspection wells); impermeable geomembrane; wood plastic composites and ultra-high molecular weight polyethylene pipes and sheets with molecular weight ≥ 2,000,000

5. Dynamic plasticizing and plastic extensional rheology plasticizing technology application and equipment manufacturing; and plastics processing equipment adopting electromagnetic induction heating and servo drive systems

6. Production of special ceramics used in industry, medical science, electronics, aviation and aerospace and other fields and the development of relevant technologies and equipment; and development of ceramics cleaner production and comprehensive utilization technologies

7. Development and manufacturing of energy efficient sewing machinery (adopting embedded digital control, oil-free or micro-oil lubrication, and other advanced technologies) and their key parts and components

8. Research, development, and manufacturing of multiple station modular machine tools used in industries such as manufacturing of writing instruments and clocks and watches

9. Development and application of high-tech digital, and intelligent printing technologies and high-definition platemaking systems

10. Manufacturing of supplies specially for ethnic minorities

11. Vacuum aluminizing, spraying silicon oxide, and polyvinyl alcohol (PVA) coating-type films, functional polyester (PET) film, oriented polystyrene (OPS) film, paper-based multi-layer co-extruded or composite packaging materials, and other new packaging materials

12. Manufacturing of equipment of metal plate printing in two or more colors, matching UV curing equipment, laminating equipment, and high-speed food and beverage cans processing equipment, as well as their ancillary equipment

13. Lithium iron disulfide, lithium thionyl chloride, and other new lithium primary batteries; lithium-ion batteries, nickel hydrogen batteries, new-structure (bipolar, plumbic acid horizon, coiled, tubular, and other) sealed lead-acid batteries, lead-carbon batteries, super batteries, fuel cells, lithium/carbon fluoride batteries, and other new batteries and super capacitors

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16、民用飛機、直升機的設計

17、航空航天用太陽能電池開發生產

十九、輕工

1、單條化學木漿30萬噸/年及以上、化學機械木漿10萬噸/年及以上、化學竹漿10萬噸/年及以上的林紙一體化生產線及相應配套的紙及紙板生產線（新聞紙、銅版紙除外）建設；採用清潔生產工藝、以非木纖維為原料、單條10萬噸/年及以上的紙漿生產線建設；先進制漿、造紙設備開發與制造；無元素氯（ECF）和全無氯（TCF）化學紙漿漂白工藝開發及應用

2、非金屬制品精密模具設計、制造

3、生物可降解塑料及其系列產品開發、生產與應用，農用塑料節水器材和長壽命（三年及以上）功能性農用薄膜的開發、生產

4、新型塑料建材（高氣密性節能塑料窗、大口徑排水排污管道、抗沖擊改性聚氯乙烯管、地源熱泵系統用聚乙烯管、非開挖用塑料管材、複合塑料管材、塑料檢查井）；防滲土工膜；塑木複合材料和分子量≥200萬的超高分子量聚乙烯管材及板材生產

5、動態塑化和塑料拉伸流變塑化的技術應用及裝備制造；應用電磁感應加熱和伺服驅動系統的塑料加工裝備

6、應用於工業、醫學、電子、航空航天等領域的特種陶瓷生產及技術、裝備開發；陶瓷清潔生產及綜合利用技術開發

7、高效節能縫制機械（採用嵌入式數字控制、無油或微油潤滑等先進技術）及關鍵零部件開發制造

8、用於制筆、鐘表等行業的多工位組合機床研發與制造

9、高新、數字、智能印刷技術及高清晰度制版系統開發與應用

10、少數民族特需用品制造

11、真空鍍鋁、噴鍍氧化矽、聚乙烯醇（PVA）塗布型薄膜、功能性聚酯（PET）薄膜、定向聚苯乙烯（OPS）薄膜及紙塑基多層共擠或複合等新型包裝材料

12、二色及二色以上金屬板印刷、配套光固化（UV）、薄膜覆膜和高速食品飲料罐加工及配套設備制造

13、鋰二硫化鐵、鋰亞硫?氯等新型鋰原電池；鋰離子電池、氫鎳電池、新型結構（雙極性、鉛布水平、卷繞式、管式等）密封鉛蓄電池、鉛碳電池、超級電池、燃料電池、鋰/氟化碳電池等新型電池和超級電容器

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Tel: +86 (10) 82689699, +86 (10) 82668266 ext. 153  
Mobile: +86 13311570713  
Fax: +86 (10) 82668268  
E-mail: [database@chinalawinfo.com](mailto:database@chinalawinfo.com)

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