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[Introduction of Major Plans]

- ▶ 13th Five-year Plan for Semiconductor Lighting Industry Development Released
- ▶ 13th Five-year Special Plan for S&T Innovation in Advanced Manufacturing Technology Released
- ▶ 13th Five-year Special Plan for S&T Innovation in Transportation Released

[Special Report]

- ▶ Four New Great Inventions of China

Sponsor: Department of International Cooperation, Ministry of Science and Technology(MOST), P.R.China

Organizer: China Association for International Science and Technology Cooperation

Add: Room 1059 , Office Building , 11 B Fuxing Road , Beijing , P.R.China 100038

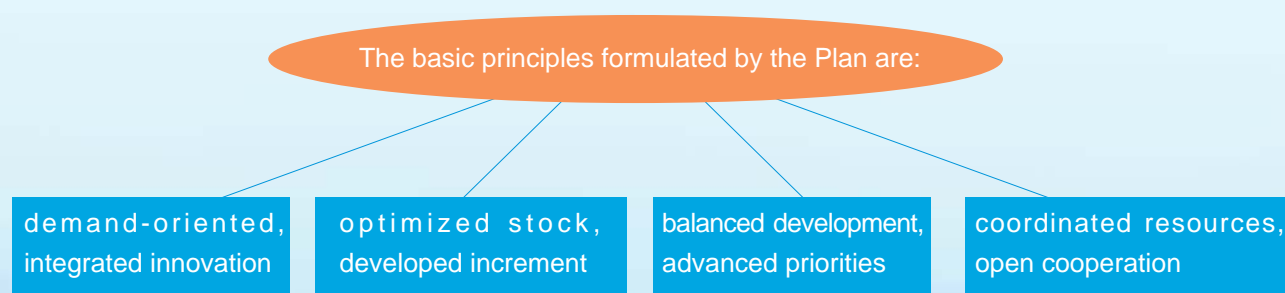
E-mail: caistc@126.com

[Introduction of Major Plans] >>>

>>> 13th Five-year Plan for Semiconductor Lighting Industry Development Released

As a revolution in the field of lighting, semiconductor lighting boasts low power consumption, long working life and rich colors. China has now become the largest semiconductor lighting producer, consumer and exporter in the world. To promote energy conservation of semiconductor lighting and sustainable development of the industry and to proactively combat climate change and facilitate ecological progress, *the 13th Five-year Plan for Semiconductor Lighting Industry Development* (hereinafter referred to as the Plan) was released by National Development and Reform Commission, Ministry of Education, Ministry of Science and Technology, Ministry of Industry and Information Technology, Ministry of Finance, Ministry of Housing and Urban-Rural Development, Ministry of Transport, Ministry of Agriculture, Ministry of Commerce, National Health and Family Planning Commission, General Administration of Quality Supervision, Inspection and Quarantine, National Government Offices Administration and National Energy Administration.

The Plan points out that our semiconductor lighting industry faces critical opportunities. In 2011, we issued *China to Phase out Incandescent Light Bulb Roadmap*, providing opportunity for the industry development in China. The implementation of *Paris Agreement* enables countries to take semiconductor lighting as an important measure to reduce carbon emission. Belt and Road Initiative, *China Manufacturing 2025* and accelerated urbanization open up market for the industry. The building of smart home and smart city provide more impetus and demand for speeding up the development of the industry.



The development goals set in the Plan are by 2020 to make breakthroughs in key semiconductor lighting technologies, improve constantly product quality, continue to optimize product structure, expand steadily industrial scale and develop clustered industry development, establish one or more LED companies with sales of over 10 billion yuan, nurture one to two internationally-renowned brands and ten domestically well-known brands, step up scaled application of OLED products, expand scope of application, regulate market environment and ultimately lay a solid foundation for China to become a major country with semiconductor lighting industry. Major development indicators for 2020 are in Table 1.

[Introduction of Major Plans] >>>

Table 1 Major development indicators for 2020

Indicator type and name		Indicator value	2015 figure	2020 target
Technology innovation	white-light LED device luminous efficiency (1m/W)		150	200
	indoor LED lighting product luminous efficiency (1m/W)		85	160
	outdoor LED lighting product luminous efficiency (1m/W)		110	180
	white-light OLED panel light luminous efficiency (1m/W)		53	125
Industrial development	Semiconductor industry production value ¹ (RMB 100 million)		4245	10000
	LED functional lighting ² production value (RMB 100 million)		1552	5400
	Proportion of LED lighting products sales in all lighting products sales (%)		40	70
	Industrial concentration ³ ratio		7	15
Energy saving and carbon reduction	Annual electricity (100 million kwh) saved by LED functional lighting		1000	3400
	CO ₂ emission reduction by LED functional lighting		9000	30600
Application market share	Functional lighting (%)		30	70

- Notes: 1. production value: whole industrial chain production of semiconductor lighting, including materials, components and application
2. functional lighting: to meet average human visual demand, artificial lighting that complements/substitutes natural lighting
3. Industrial concentration ratio: ratio of top 10 companies' production value in overall production value

[Introduction of Major Plans] >>>

The Plan requires that we continue to lead and innovate, promote cross-border integration and set up an industrial chain that features basic research and cutting-edge technology, major common and key technology, application demonstration, innovative design and integrated organization.

Basic research and cutting-edge technology:

study large lattice mismatch and strong polarized semiconductor lighting materials and their epitaxial growth kinetics, doping kinetics, defect formation of low-dimensional quantum structure and control law and strain control laws; research into the carrier transport, composition, transition of low-dimensional quantum structure and their control laws; study new ideas, new structure and new functional semiconductor lighting material and devices; research into semiconductor lighting and human factor, biological action mechanism, explore lighting's influence on human health and comfort, its utility on different things and set up photo-biological response and light safety database.

Major common and key technology:

study ultra-high energy efficient, high-quality and full spectrum semiconductor lighting core material and major key and common technology of components, light source and lights, develop large-size substrate, epitaxial chip preparation, core supporting materials and key equipment, promote the industrialization of silicon substrate LED key technology, develop highly efficient OLED lighting material and study new OLED components and lighting products.

Integrated application and innovative demonstration:

develop lighting products and integrated system for smart lighting, health care and agriculture and carry out application demonstration.

The Plan clearly points out that it is encouraged to build professional LED innovative service platform featuring research, development and design, technology transfer, result transfer, business incubator, technology consultation, standard testing and certification, e-business, finance, talent nurturing, information exchange, brand building and international resource matching by way of market mechanism, professional service and capitalization. Crowd sourcing and crowd funding are encouraged to build a crowd entrepreneurship LED platform that is professional, market-oriented, integrated and networked.

[Introduction of Major Plans] >>>

The Plan formulates goals for popularizing LED lighting products in 2020:

Public institution: public organizations lead the way and plan to use 300 million LED lighting products.

City public lighting and transport area: promote renovation and demonstration of urban public lighting and application of 15 million LED street lamps and tunnel lamp. 50% of urban road lighting should be covered by LED lighting. LED lighting should also be disseminated in transport area.

Industry and service industry: promote LED application in factories, malls, supermarkets and office buildings with 1.5 billion LED lighting products.

Residential homes: encourage residents to use LED products by decoration and renovation. Promote the use of 1 billion LED products.

Special emerging areas: boost LED products in smart city, smart home, agriculture, health care, cultural tourism, water treatment, visible light communication and automobiles and carry out 100 demonstrative programs in these areas.

The Plan emphasizes to boost international and regional cooperation and industrial competitiveness in international arena, tap into bilateral and multilateral cooperation channels in areas like S&T, energy conservation and environmental protection, climate change and trade, integrate into international cooperation network and explore new approaches and mechanisms for cooperation, carry out international collaboration on semiconductor lighting technology, standard setting, identification, detection and certification, facilitate the building of joint laboratory, research center, design center, technology service center, S&T park and technology demonstration base, support qualified companies in setting up overseas branch, overseas investment and A&M, infrastructure building, energy conservation projects and product export, deepen global capacity cooperation, encourage companies to expand international market, guide companies to participate in the building of overseas trade and industrial cooperation region so as to drive our semiconductor lighting products and technology output, set up cross-boarder e-business platform, promote our products' competition in international market, utilize financing channels like silk road fund, Asian Infrastructure Investment Bank (AIIB) and New Development Bank to carry out semiconductor lighting application, administration and dissemination, encourage industrial technology organizations to lead our companies to go global by offering technological services and carry out LED lighting Belt and Road action plan.

(Source: National Development and Reform Commission, July 10th 2017)

[Introduction of Major Plans] >>>

>>> 13th Five-year Special Plan for S&T Innovation in Advanced Manufacturing Technology Released

Socioeconomic development in China requires manufacturing industry to provide more advanced manufacturing technologies, high-quality consumption products and fully autonomous major technological equipment. Upgrading from big manufacturing country to strong manufacturing country is a strategic choice for industrial development. The Ministry of Science and Technology formulated the *13th Five-year Special Plan for S&T Innovation in Advanced Manufacturing Technology* (hereinafter referred to as the Plan). The Plan clearly outlines the overall thinking, development goals, key tasks and guarantee measures.

1. Develop network coordinated manufacturing model with Internet, enhance key technology breakthrough Internet of Things and big data, boost key equipment for emerging industry, intelligent robots and 3D printing manufacturing, strive to make breakthrough and win strategic initiative.

2. Overcome issues like weak manufacturing capacity and low quality products, work on core basic components like bearings, hydraulic part, instrument and apparatus and R&D of core software products in process database, material parameter database and manufacturing process.

3. With cloud computing, big data and Internet of Things, we need to innovate big data manufacturing service, mass customization and company management models like group management and control, explore integrated innovation of IT and manufacturing technology.

4. To address resource and environment constraint, we need to upgrade traditional industry based on IT technology, explore life cycle green model with efficient, energy- and material-saving product design, smart process and service maintenance and push forward the sustainable development of manufacturing industry.

The development thinking outlined in the Plan is:

[Introduction of Major Plans] >>>

The Plan has outlined 13 key tasks in terms of system integration, intelligent manufacturing, manufacturing base and innovative and demonstrative projects of advanced manufacturing technology:

- ❖ (1) additive manufacturing
- ❖ (2) laser manufacturing
- ❖ (3) intelligent robot
- ❖ (4) manufacturing equipment and packaged technology of large scale integrated circuits
- ❖ (5) new key equipment of electronic manufacturing
- ❖ (6) high-end numerical control machine and basic manufacturing equipment
- ❖ (7) intelligent equipment and advanced processes
- ❖ (8) basic manufacturing technology and key components
- ❖ (9) industrial sensors
- ❖ (10) intelligent factories
- ❖ (11) networked cooperative manufacturing
- ❖ (12) green manufacturing
- ❖ (13) innovative demonstration program of advanced manufacturing technology

To meet development goals and complete key tasks, the Plan puts forward guarantee measures:

1. Innovate research approaches and coordinate and promote demonstration programs.

2. Enhance top-level design based on overall national goals.

3. Boost environment building for talents and bases and step up international cooperation and exchanges.

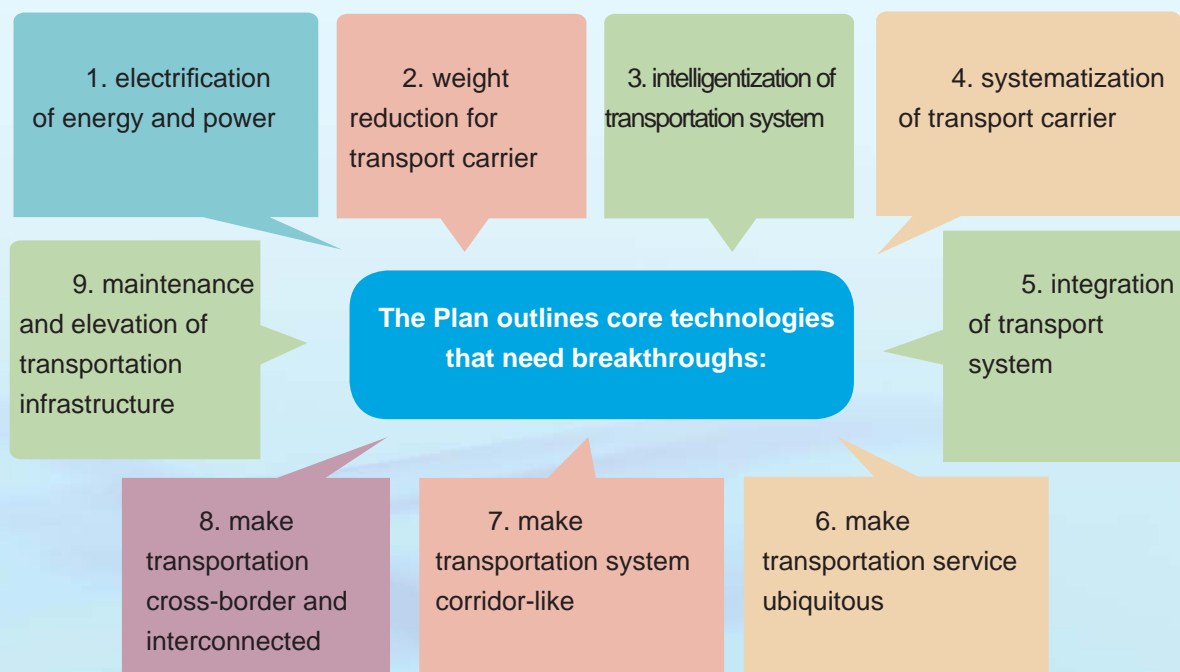
(Source: Ministry of Science and Technology, May 16th 2017)

[Introduction of Major Plans] >>>

>>> 13th Five-year Special Plan for S&T Innovation in Transportation Released

To enhance capacity for research and development and S&T innovation, the Ministry of Science and Technology and Ministry of Transport jointly formulated and issued the *13th Five-year Special Plan for S&T Innovation in Transportation* (hereinafter referred to as the Plan). The Plan covers main transportation modes like rail transit, road transport, waterway transport, air transport, integrative traffic transport and smart transport. It elaborates on our guiding thought, development goals, key tasks and policy measures for S&T innovation in transportation from 2016 to 2020.

The development goals set by the Plan are to meet the demands posed by safe, efficient and green transportation system and national security, to enhance deep integration of artificial intelligence, new material and new energy and transportation demands, to develop highly efficient, safe, comprehensive and intelligent technology and equipment, to set up a transportation core technology system that meets national demands and reaches internationally advanced level, to nurture new energy carrier, transit transportation, navigation transportation and green water transport equipment and boost global competitiveness of our transportation industry and equipment manufacturing industry and capacity for sustainable development.



[Introduction of Major Plans] >>>

The layout of the major S&T projects in the Plan is as follows:

❖ 1. Integrated demonstration project of track safety and operation guarantee technology based on space, air and land-based information integration.

❖ 2. National comprehensive rail transit experiment and system test environment.

❖ 3. Integrated demonstration project of national strategic transportation corridor technology.

❖ 4. Integrated demonstration project of comprehensive regulation of transportation in air harbour hub.

❖ 5. Integrated demonstration project of interconnection technology of Eurasia high-speed rail.

❖ 6. Test environment for broadband mobile interconnected space and land transportation system.

❖ 7. Integrated demonstration project of key technology for low-altitude airspace regulation and utilization.

❖ 8. Integrated application and demonstration project of road infrastructure maintenance and elevation technology.

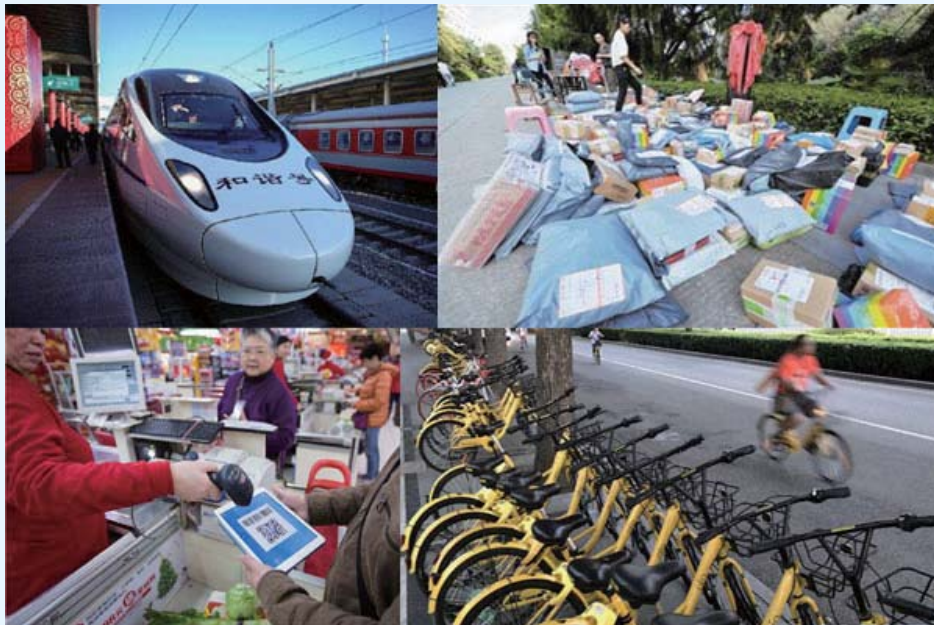
❖ 9. Integrated demonstration project of Belt and Road harbour intelligent transportation and management technology.

❖ 10. Integrated demonstration project of e-marine technology in Chinese sea area.

(Source: Ministry of Science and Technology, June 1st 2017)

[Special Report] >>>

>>> Four New Great Inventions of China



Compass, paper-making, gunpowder and printing are four great inventions created by ancient China, which have rewritten world history. During the Belt and Road Forum for International Cooperation, a survey on the young was conducted in 20 countries. The result showed that high-speed rail, online shopping, Alipay and bike sharing are the new four great inventions of China in the hearts of foreigners living in China. The new inventions are dramatically changing people's lives and contribute Chinese wisdom and solutions to overcoming challenges facing mankind.

The technology of high-speed rail originated in Europe and Japan. Now China is leading its way. From catching up to leading the world and from mere manufacturing to setting up standards for the world, China has experienced introduction, assimilation and innovation for high-speed rail. By the end of last year, China has invested in 2,595 sets of high-speed trains, over 60% of world's total. Mileage open for operation reached over 20,000 km. It was expected to reach 45,000 km by 2030. Fuxing high-speed train boasts extensive adoption of Chinese standards. In 254 major standards applied to the train, 84% were formulated by China.

With the arrival of mobile Internet age, China has become the world's No.1 retail online market with over 700 million netizens. Online shopping in China has provided "Internet business opportunities" for global economy. Online shopping covers from China to our Asian neighbors like Vietnam and Thailand and places as far as Argentina and Brazil. Online shopping has boomed worldwide.

No one has ever thought about the magic China is playing with now. That is to stride over barter and currency and pay with the easy way of scanning QR code. The application of Alipay has spread like wildfire. As of July 31st 2017, the number of active mobile payment account and daily average transaction has both exceeded 600 million.



[Special Report] >>>

Bike sharing facilitates green and convenient travelling. In June 2017, Mobike completed its new round of financing of 600 million dollars. In early July, ofo also announced that it completed its new round of financing of 700 million dollars. In a short span of two years, bike sharing quickly emerged in all streets of China. Currently Mobike has over 5 million bikes under operation in the world with the highest daily order of over 25 million and registered users of over 100 million. Bike manufacturing is a traditional industry that has been marginalized for a long time. With the advent of bike sharing, it has now returned to its glorious days and become a sunrise industry. Shared bikes even turned up in Cambridge -- Bicycle Capital of the UK. *Financial Times* reported that booming shared bikes in China is an example of China leading the world in innovation.

S&T innovation is like a lever that can move the whole world and make unexpected miracles. High-speed rail is a tangible net that China weaves to connect with the world, while online shopping is an intangible net that connects the corners everywhere. Alipay is a global producer, operator and consumer that transcends geographical limitation and enables easy financial transaction in the intangible net. Shared bikes are the consumers' "little partners" resolving "last mile" challenge.

Four New Great Inventions weave intangible and tangible nets. Inventions elevate Chinese people's livelihood and make China a country that helps develop and warms the whole world.

Some experts pointed out that major conditions for the emergence of high-speed rail, online shopping, Alipay and bike sharing were the vast land, huge market and large population in China. More decisive factors for the emergence were the development of China's S&T innovation forces and improvement of technology infrastructure.

When a country with ancient civilization sees innovation as its top priority for development and puts S&T innovation at the core of overall innovation and when the late comer of industrial revolution catches up with utmost efforts and strives to be the leading force, symbolic hi-tech products and service will emerge. The easy move of shaking e-envelope needs concrete support of cloud computing, new generation mobile communication and big data. And the scanning of QR code on shared bikes is enabled by navigation, mobile payment and Internet of Things.

Wired pointed out that future opportunities are in the hands of China. What we need to do is changing our prejudice against Chinese innovation. China is changing, so is China's image in the eyes of the world.

(Source: Xinhua News Agency, August 11th 2017)