China's Energy Policy 2012

The Information Office of the State Council, or China's cabinet, on Wednesday published the 2012 edition of white paper on the country's energy policy.

Following is the full text:

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Information Office of the State Council

The People's Republic of China

October 2012, Beijing

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Preface

Energy is the material basis for the progress of human civilization and an indispensable basic condition for the development of modern society. It remains a major strategic issue for China as the country moves towards its goals of modernization and common prosperity for its people.

Since China adopted the policy of reform and opening up in the late 1970s, its energy industry has made great advances. China is now the world's largest energy producer. It has built up a comprehensive energy supply system comprising coal, electricity, petroleum, natural gas, and new and renewable energy resources. Its universal energy service and civil energy use conditions have markedly improved. Its thriving energy industry provides a guarantee for the country to reduce poverty, improve the people's livelihood and maintain long-term, steady and rapid economic development.

However, China's energy development still faces many challenges. The country's energy resource endowment is not high and its per-capita share of coal, petroleum and natural gas is low. Its energy consumption has grown too quickly in recent years, increasing the strain on energy supply. Fossil energy resources have been exploited on a large scale, causing a certain amount of damage to the eco-environment.

To curb excessive consumption of energy resources and achieve the comprehensive, balanced and sustainable development of the economy, society and ecology, China keeps strengthening its efforts in energy conservation and emission reduction, and strives to raise the efficiency of energy utilization. As a result, energy consumption per unit of GDP has been decreasing year by year. China will continue to take the Scientific Outlook on Development as its guiding principle, and work hard to transform its development pattern, giving prominence to building a resource-conserving and environment-friendly society. It relies on scientific, technological and system innovation to raise efficiency in all aspects of energy utilization, further develops new and renewable energy resources, and promotes the clean and efficient development and utilization of fossil energy resources. The country endeavors to build a modern energy industry which is secure, stable, economical and clean, in order to provide a solid guarantee for bulding a moderately prosperous society in all respects and make greater contributions to the world's economic development.

I. Current Energy Development

Since the reform and opening-up policy was introduced, China's energy industry has witnessed rapid growth, achieving comprehensive development of coal, electricity,

petroleum, natural gas, and new and renewable energy resources, making important contributions to the long-term, steady and rapid growth of the national economy and the sustained improvement of living standards.

-- Remarkable enhancement of energy supply capability and security. In 2011, the output of primary energy equaled 3.18 billion tons of standard coal, ranking first in the world. Of this, raw coal reached 3.52 billion tons; crude oil, 200 million tons; and refined oil products, 270 million tons. The output of natural gas ballooned to 103.1 billion cu m. The installed electricity generating capacity reached 1.06 billion kw, and the annual output of electricity was 4.7 trillion kwh. A comprehensive energy transportation system has developed rapidly. The length of oil pipelines totaled more than 70,000 km, and the natural gas trunk lines exceeded 40,000 km. Electric power grids were linked up throughout the country, and electricity transmission lines of 330 kv or more totaled 179,000 km. The first phase of the national petroleum reserve project was completed, and the country's emergency energy-supply capability keeps improving.

-- Conspicuous achievements in energy conservation. China vigorously promotes energy conservation. During the 1981-2011 period, China's energy consumption increased by 5.82 percent annually, underpinning the 10 percent annual growth of the national economy. From 2006 to 2011, the energy consumption for every 10,000 yuan of GDP dropped by 20.7 percent, saving energy equivalent to 710 million tons of standard coal. The state implemented a series of energy-saving renovations, such as of boilers, electrical machinery, buildings and installation of green lighting products. The gap between the overall energy consumption of China's high energy-consuming products and the advanced international level is narrowing. The energy utilization efficiency of new projects in the heavy and chemical industries, such as non-ferrous metals, building materials and petrochemicals, is up to the world's advanced level. The country has eliminated small thermal power units with a total generating capacity of 80 million kw, saving more than 60 million tons of raw coal annually. In 2011, coal consumption of thermal power supply per kwh was 37 grams of standard coal lower than in 2006, a decrease of 10 percent.

-- Rapid development in non-fossil energy. China has made energetic efforts in developing new and renewable energy resources. In 2011, the installed generating capacity of hydropower reached 230 million kw, ranking first in the world. Fifteen nuclear power generating units were put into operation, with a total installed capacity of 12.54 million kw. Another 26 units, still under construction, were designed with a total installed capacity of 29.24 million kw, leading the world. The installed generating capacity of wind power connected with the country's power grids reached 47 million kw, ranking top in the world. Photovoltaic power generation also reported speedy growth, with a total installed capacity of 3 million kw. Solar water heating

covered a total area of 200 million sq m. The state also expedites the use of biogas, geothermal energy, tidal energy and other renewable energy resources. Non-fossil energy accounted for 8 percent of the total primary energy consumption, which means an annual reduction of more than 600 million tons of carbon dioxide (CO2) emission.

-- Quick advance in science and technology. A fairly complete system of exploration and development technologies has taken shape in the petroleum and natural gas industry, with prospecting and development techniques in geologically complicated regions and the recovery ratio of oilfields leading the world. Oil drilling rigs that are capable of operating at a maximum water depth of 3,000 m have been built. China is now able to independently design and build oil refinery equipment, each set of which boasts an annual output of 10 million tons, and ethylene production plants, each of which has an annual output of one million tons. The country's direct coal liquefaction and coal-to-olefins technologies, for which it owns independent intellectual property rights, have reached the world's advanced level and achieved new breakthroughs in technology. In addition, 60 percent of the country's coal mines have been mechanized, and mechanized underground mining equipment with an annual output of six million tons is installed nationwide. Electric power generating units featuring a large capacity and high parameters, including ultra-supercritical and air-cooled generators each with an installed capacity of one million kw, have been installed widely. The designing and manufacturing of 700,000-kw hydraulic turbine generators have reached the world's advanced level. China is now able to independently design and build one-million-kw pressurized water reactor nuclear power plants, and has made outstanding breakthroughs in the R&D of high-temperature gas-cooled reactors and fast reactors. Also, 3,000-kw wind power generators have been mass-produced and 6,000 kw wind power generators have come off the production line. The solar photovoltaic industry has formed a sound manufacturing chain, with an annual output of solar panels accounting for more than 40 percent of the world's total. China leads the world in extra-high-voltage DC/AC power transmission technology and manufacturing.

-- Marked improvement in civil energy use conditions. The state actively promotes civil energy projects and works to enhance the overall level of energy service. Compared with 2006, the per-capita primary energy consumption in 2011 equaled 2.6 tons of standard coal, a 31 percent increase; the per-capita natural gas consumption reached 89.6 cu m, an increase of 110 percent; and the per-capita electricity consumption was 3,493 kw, a 60 percent increase. The first and second west-east gas pipelines have been completed, and more than 180 million people across the country have access to natural gas. The government has invested more than 550 billion yuan in power grid upgrading projects for rural areas, fundamentally improving access to electricity for rural residents. The Qinghai-Tibet electricity network project has been completed, connecting the power grid of the Tibetan plateau with those of the other parts of China. The state is accelerating the construction of electric power facilities in

areas that as yet do not have electricity, and has so far ensured that more than 30 million people have access to electricity. Combined heat and power projects with a total installed capacity of 70 million kw have been built in high-altitude and frigid areas in northern China that provide more than 40 million urban residents access to heating.

-- Remarkable progress in environmental protection. The country is quickening the pace of control of coal mining subsidence areas, and establishes and improves the compensation mechanism for the exploitation of coal resources and restoration of the eco-environment. In 2011, the coal washing rate reached 52 percent and the land reclamation rate, 40 percent. Existing power plants have speeded up their desulfurization and denitration upgrading, and coal-fueled generating units with flue gas desulphurization facilities accounted for 90 percent of the national total. Coal-fueled generating units reported a 100-percent installation of dust-cleaning facilities and a 100-percent discharge of waste water up to the relevant standards. The state is intensifying efforts for the development and utilization of coal bed methane (CBM), extracting 11.4 billion sq m of CBM in 2011. China became the first country to adopt a national standard for CBM emissions. Its energy consumption per unit of GDP has dropped over the past five years, eliminating 1.46 billion tons of CO2 discharge.

-- Energy systems and mechanisms gradually improving. The market mechanism is playing an increasingly important role in resource allocation. Investors in the energy field are diversified, and private investment in it keeps growing. Market competition has been introduced into the production and distribution of coal. In the electric power industry, government administrative functions and enterprise management have been separated, as has power production from power transmission, and a supervisory system has taken shape. Energy pricing reform has been deepening, and the pricing mechanism is gradually improving. Relevant policies and measures for the sustainable development of the coal industry have been tried out. The state has also established a feed-in tariff (FIT) system for wind and photovoltaic power generation, and a renewable energy development fund. The legal system of energy-related laws has been strengthened, and a number of laws and regulations have been amended and published in the past few years, including the Energy Conservation Law, Renewable Energy Law, Circular Economy Promotion Law, Law on the Protection of Oil and Natural Gas Pipelines, Regulations on Energy Conservation in Civil Buildings, and Regulations on Energy Conservation by Public Institutions.

As the world's largest energy producer, China mainly relies on its own strength to develop energy, and its rate of self-sufficiency has reached around 90 percent. China's energy development not only guarantees domestic economic and social development, but also makes significant contributions to global energy security. For some time to come, China's industrialization and urbanization will continue to accelerate, and the

demand for energy will go on increasing, and so its energy supply will confront increasingly tougher challenges.

-- Prominent resources restraint. China's per-capita average of energy resources is low by world standards. China's per-capita shares of coal, petroleum and natural gas account for 67 percent, 5.4 percent, and 7.5 percent of the world's averages, respectively. Although China has experienced rapid growth in energy consumption over the past few years, its per-capita energy consumption is still low - only one third of the average of developed countries. But as the economy and society progress and living standards improve, China's energy consumption will continue to rise sharply, and there will be a growing restraint on resources.

-- Low energy efficiency. China's industrial structure is yet to be rationalized and the economic growth pattern to be improved. Energy consumption per unit of GDP is much higher than those of developed countries and some newly industrialized countries. Energy-intensive industries are backward in technology. The percentage of energy consumption by the secondary industries, especially the energy-intensive industrial sectors, is too high in the country's total. The energy consumption of four major energy-intensive industries - steel, non-ferrous metals, chemicals, and building materials - accounts for 40 percent of the national total. Low energy efficiency results in high energy consumption for every unit of GDP.

-- Increasing environmental pressure. Extensive development of fossil energy, particularly coal, has had a serious impact on the eco-environment. Large areas of arable land are taken up for other uses or even spoiled, water resources are seriously polluted, the discharge of carbon dioxide (CO2), sulfur dioxide (SO2), nitrogen oxides (NOx) and toxic heavy metals remains high, and emissions of ozone and particles smaller than 2.5 micrometers (PM2.5) are increasing. For a long time to come, fossil energy will continue to dominate the energy consumption mix, posing a growing challenge for protecting the environment and countering climate change. A more environment-friendly energy mix is urgently needed.

-- Grave challenges to energy security. The country's dependence on foreign energy sources has been increasing in recent years. In particular, the percentage of imported petroleum in the total petroleum consumption has risen from 32 percent at the beginning of the 21st century to the present 57 percent. Marine transportation of petroleum and cross-border pipeline transmission of oil and gas face ever-greater security risks. Price fluctuations in the international energy market make it more difficult to guarantee domestic energy supply. It will not be easy for China to maintain its energy security since its energy reserves are small and its emergency response capability is weak.

-- Reforms called for current systems and mechanisms. Energy-related systems and mechanisms still suffer from some long-term, deep-rooted problems. The energy pricing mechanism is yet to be perfected, and industrial management is still weak. The overall service level needs to be enhanced. Overall, restraints of the current systems and mechanisms have seriously hindered the rational development of the country's energy industry.

The above problems challenging China's energy development are a result of the international energy competition, and China's levels of productivity and development, as well as the country's irrational industrial structure and energy mix, extensive development and utilization of energy resources, and sluggish reform of relevant systems and mechanisms. Therefore, China will vigorously promote the transformation of its energy production and utilization modes, continuously improve its energy policy, and strive to achieve a comprehensive, balanced and sustainable development of its energy, economy, society and eco-environment.

II. Policies and Goals of Energy Development

As the largest developing country in the world, China is faced with the daunting tasks of developing its economy, improving its people's livelihood, and building a moderately prosperous society. It is an important strategic task of the Chinese government to maintain long-term, stable and sustainable use of energy resources. China's energy development must follow a path featuring high-tech content, low consumption of resources, less environmental pollution, satisfactory economic returns, as well as security. It is moving towards the objective of economical, clean and secure development.

The basic contents of China's energy policies are: "giving priority to conservation, relying on domestic resources, encouraging diverse development, protecting the environment, promoting scientific and technological innovation, deepening reform, expanding international cooperation, and improving the people's livelihood." The state strives to advance the transformation of its energy production and utilization modes, and build a modern energy industrial system which features secure, stable, economical and clean development, so as to support sustainable economic and social development with sustainable energy development.

-- Giving priority to conservation. The state exercises control over both total energy consumption and intensity. It is working to build an energy-saving production and consumption system, promote the transformation of the patterns of economic development and household consumption, and accelerate the pace of building an energy-efficient country and an energy-saving society.

-- Relying on domestic resources. The country relies on domestic resource advantages and its own development basis, makes special efforts to enhance its energy supply capability and security, improves its emergency energy reserve and emergency response systems, and controls its dependence on foreign energy sources.

-- Encouraging diverse development. China endeavors to raise the proportion of clean, low-carbon fossil energy and non-fossil energy in the energy mix, promotes the efficient and clean utilization of coal, develops substitute energy resources in a scientific way, and speeds up the optimization of energy production and the consumption mix.

-- Protecting the environment. The state encourages fostering the concept of environment-friendly and low-carbon development, coordinates the development and use of energy resources with the protection of the eco-environment while paying equal attention to both, and actively fosters an energy development pattern that meets the requirements of ecological civilization.

-- Promoting scientific and technological innovation. The state strengthens basic scientific research and frontier technological research in the energy field to enhance its scientific and technological innovation capabilities. Through the implementation of key energy projects, the state advances independent innovation in key technologies and equipment, and speeds up the fostering of innovative personnel.

-- Deepening reform. The state gives full play to the role of the market mechanism, makes unified planning with due consideration for all concerned, addresses both root causes and symptoms of various problems, and expedites the reform in key fields and links to establish a framework of systems and mechanisms conducive to sustainable energy development.

-- Expanding international cooperation. China gives simultaneous consideration to both domestic and international energy development, works to increase the scope, channels and forms of international cooperation, enhances its capability to "introduce" and "go global," propels the establishment of a new international energy order and promotes mutually beneficial cooperation.

-- Improving the people's livelihood. The state coordinates energy development in both urban and rural areas, enhances energy infrastructure and basic public services, and strives to eliminate energy poverty and improve civil energy-use conditions.

It is stipulated in the Outline of the 12th Five-Year Plan (2011-2015) for National Economic and Social Development that by 2015 non-fossil energy will rise to 11.4 percent in the national total primary energy consumption, energy consumption per

unit of GDP will drop by 16 percent from 2010, and CO2 emission per unit of GDP will decrease by 17 percent from 2010.

The Chinese government has made the commitment that by 2020 non-fossil energy will account for 15 percent of its total primary energy consumption, and CO2 emission per unit of GDP will be 40-45 percent lower than in 2005. As a responsible nation, China will make every effort to fulfill its commitment.

III. All-round Promotion of Energy Conservation

China is a country with a large population but relevant deficiency in resources. To attain sustainable use of energy resources and sustainable economic and social development, it must take the path of conserving energy.

China always puts energy conservation in the first place. In the early 1980s, it put forward the development policy of "stressing both development and saving, with priority given to saving." The Chinese government issued the Decision of the State Council on Strengthening Energy Conservation in 2006. It issued the Comprehensive Work Plan on Energy Conservation and Emission Reduction in 2007, making an all-round plan for the major sectors of energy consumption, such as industry, construction and transportation. China carried out ten key energy-conservation projects, including the innovation of coal-fueled industrial boilers (kilns), surplus heat and pressure utilization, energy saving in electrical motors, construction of energy-saving buildings, the green lighting project, and energy saving in government bodies, thus increasing its energy-conservation capacity to 340 million tons of standard coal. The Chinese government launched an energy conservation drive among 1,000 enterprises, resulting in a sharp decline in the comprehensive energy consumption index of key industries, and saving energy equivalent to 150 million tons of standard coal. China's energy consumption per unit of GDP dropped 19.1 percent during its 11th Five-Year Plan period (2006-2010).

In 2011, the State Council released the Comprehensive Work Plan on Energy Conservation and Emission Reduction During the 12th Five-Year Plan Period. This plan proposed the major objectives and key actions in the fields of energy conservation and emission reduction during this period. China aims to establish a "reverse coercion mechanism" through the dynamic integration of its efforts in lowering the intensity of energy consumption, reducing the total emissions of major pollutants, and rationally controlling total energy consumption. The "reverse coercion mechanism" helps promote the strategic restructuring of the economy, push forward the optimization of the industrial structure, and strengthen all aspects of energy utilization management in industry, construction, transportation, and public organizations, as well as in the fields of urban and rural construction and consumption,

thus contributing to the building of a resource-conserving and environment-friendly society.

-- Optimization of the industrial structure. The country puts the adjustment of the industrial structure in the key place of its energy conservation strategy. It exercises strict control over low-level duplicated construction, and eliminates industries with high consumption and high pollutant emission, and backward productivity. China expedites the transformation of its traditional industries with advanced and applicable technology. It raises the entry threshold for processing trade, and promotes its transformation and upgrading. It improves the structure of foreign trade, and transforms its energy- and labor-intensive development mode into a capital- and technology-intensive one. It pushes forward the development of the service trades, fosters and develops emerging industries of strategic importance, and speeds up the formation of pioneer and pillar industries.

-- Strengthening energy conservation in industry. With its energy consumption taking up about 70 percent of China's total, industry is the major energy consumer in China. The state has drawn up catalog of advanced and applicable technologies in the fields of energy conservation and emission reduction for key industries such as iron and steel, petrochemicals, non-ferrous metals and building materials, for the purpose of eliminating backward technology, equipment and products, and developing energy-saving and high-value-added products and equipment. It has established and improved a mandatory standards system of quotas for energy consumption per-unit product in key industries, and strengthened the energy-saving evaluation and supervision system. It has undertaken key energy-saving projects, including simultaneous generation of heat and power, recycling of industrial by-product gas, construction of enterprise energy-control centers, and fostering of energy-saving industries, so as to increase its enterprises' e
ergy utilization efficiency.

-- Promoting building energy conservation. China makes vigorous efforts to construct green buildings and comprehensively advance energy conservation in buildings. It sets and improves the standards for green buildings, and implements rating and identification of green buildings. It actively promotes energy-saving renovation of existing buildings, and sets quotas for energy consumption by public buildings and publicizes their energy efficiency rates. It has set up a management system for the life cycles of buildings, and exercises strict control over demolition of buildings. China has also made and implemented an energy-saving plan for public institutions, and strengthened the establishment of a supervisory system for energy conservation in public buildings. It carries forward heat metering and energy efficiency renovations on existing residential heating systems in the northern regions of China, builds energy-saving greenhouses, improves the old heat-supply network, and practices

metered heat-supply charging
and energy consumption quota management.

-- Pushing forward energy conservation in transportation. China continues to give priority to public transport, actively develops intercity rail transportation, and rationally encourages green commuting. China implements the fuel economy standard of the world's advanced level for automobiles, and popularizes energy-saving and environment-friendly vehicles. It speeds up the elimination of old automobiles, locomotives and ships. Vigorous efforts are made to optimize the transportation structure and develop green logistics. China increases the electrification rate in rail transportation, and launches energy-saving renovations at airports, piers and railway stations. It actively develops and popularizes new energy vehicles, and makes scientific plans for the construction of supporting facilities, including compressed natural gas filling and electricity charging facilities.

-- Promoting energy conservation among all citizens. The Chinese government will intensify efforts in energy-saving education and publicity. It works hard to bring into being a green mode of consumption and green lifestyle among urban and rural residents, and strengthens the public awareness of the importance of resource conservation. It strictly enforces the energy-saving standards of public institutions, and gives full play to the demonstration and leading role of government organs in energy conservation. It mobilizes all sectors of society to participate in energy conservation by conducting relevant activities in residential areas, schools, government organs, the armed forces and enterprises. All these measures help build a long-term mechanism of energy conservation with the participation of all sectors of society. Attention is also paid to energy conservation and emission reduction in rural areas, such as the construction of energy-saving houses.

IV. Vigorously Developing New and Renewable Energy

Vigorously developing new and renewable energy is a key strategic measure for promoting the multiple and clean development of energy, and fostering emerging industries of strategic importance. It is also an urgent need in the protection of the environment, response to climate change and achievement of sustainable development. Through unswerving efforts in developing new and renewable energy sources, China endeavors to increase the shares of non-fossil fuels in primary energy consumption and installed generating capacity to 11.4 percent and 30 percent, respectively, by the end of the 12th Five-Year Plan.

-- Actively developing hydropower. China boasts abundant hydropower resources. Its technically exploitable hydropower resources are equal to 542 million kw, putting the country first in the world. Calculated according to power generation, less than 30 percent of China's hydropower resources are currently utilized, leaving plenty of room

for development in this regard. In order to attain the goal of increasing non-fossil energy consumption to 15 percent of the total energy consumption by 2020, more than half will come from hydropower development. On the condition that the ecological environment is protected and resettlements of local people affected are properly handled, China will energetically develop hydropower. By integrating hydropower development with promotion of local employment and economic development, the Chinese government aims to "develop local resources, stimulate local economic development, improve the local environment and benefit local people." The country strives to improve its resettlement policies regarding local people affected by hydropower projects, and perfect the benefit-sharing mechanism. China will strengthen ecological-protection and environmental-impact assessment, strictly implement measures to protect the environment of existing hydropower stations, and improve the comprehensive utilization level and eco-environmental benefits of water resources. In accordance with rational river basin planning for hydropower development, China will speed up the construction of large hydropower stations on key rivers, develop medium- and small-sized hydropower stations based on local conditions, and construct pumped-storage power stations in appropriate circumstances. The country's installed hydropower generating capacity is expected to reach 290 million kw by 2015.

-- Developing nuclear power in a safe and highly efficient way. As nuclear power is a high-quality, clean and efficient modern energy source, its development is of great significance for optimizing the nation's energy structure and ensuring national energy security. At present, nuclear power only accounts for 1.8 percent of China's total power output, far below the world average, which is 14 percent. Nuclear safety is essential for nuclear power development. Since the Fukushima Daiichi nuclear disaster in 2011, China has launched comprehensive safety inspections at all nuclear power plants. The inspection results show that nuclear security is guaranteed in China. Over the past 20 years, Chinese nuclear power units in operation have never had accidents at and above Level 2, with major operating parameters being better than the world's average and some indices even reaching the leading or advanced world level. Upholding a scientific and rational concept of nuclear security, China implements the principle of "safety first" in the whole process of nuclear power station planning, site selection, R&D, design, construction, operation and decommissioning. It has established and improved a legal system on nuclear power, improved and optimized the safety management mechanism of nuclear power, set a high entry threshold in this regard, and clarified safety responsibility. It has improved the supervision system of nuclear power by strengthening safety supervision and inspection, and radiation environment supervision and management at nuclear power plants in operation and under construction. An emergency mechanism for nuclear accidents has been established and improved to enhance the country's emergency response capability. China will invest more in nuclear power technological innovations, promote

application of advanced technology, improve the equipment level, and attach great importance to personnel training. China's installed capacity of nuclear power is expected to reach 40 million kw by 2015.

-- Effectively developing wind power. As a non-water renewable energy, wind power is currently the most appropriate energy source for large-scale development and market-driven utilization. China's wind power industry is the fastest-growing in the world. During the 12th Five-Year Plan period, China will stress both intensive and distributed exploitation, and optimize the development layout of wind power. It will push forward wind power construction in an orderly way in the northwestern, northern and northeastern regions, which boast abundant wind energy, and speed up the development and utilization of distributed resources. It will steadily develop offshore wind farms, and improve the standards for wind-power equipment and the supervision system of this industry. China will encourage wind-power equipment manufacturers to expedite R&D of key technologies, so as to accelerate the technological upgrading of this industry. By means of speeding up grid construction, increasing the grid's dispatch level, improving the performance of wind-power equipment, and strengthening wind-power prediction and forecast, China aims to improve its power grids' wind-power integration ability. The installed generating capacity of wind power is expected to reach 100 million kw by the end of 2015, with 500 kw of generating capacity coming from offshore wind farms.

-- Actively making use of solar energy. China is rich in solar energy, which boasts immense room for development and has a promising future. During the 12th Five-Year Plan period, China will promote diverse patterns of solar-power development by integrating intensive exploitation with distributed utilization. It will construct large on-grid photovoltaic power stations and solar power generation projects in Qinghai and Gansu provinces, and the Xinjiang Uygur and Inner Mongolia autonomous regions, which boast abundant solar energy and scattered plots of unutilized land, for the purpose of increasing local supplies of electricity. It will encourage the central and eastern regions to construct distributed photovoltaic power generation systems linked to local buildings. Intensified efforts will be made to popularize solar water heaters, and promote the development of solar central hot-water supply, solar heating and cooling, and medium- and high-temperature industrial applications of solar energy. It will spread solar water heaters, solar cookers and solar houses in the countryside, border areas, and small cities and towns. China's installed generating capacity of solar energy is expected to exceed 21 million kw by 2015, with a total solar heat collection area of 400 million sq m.

-- Developing and utilizing biomass energy and other types of renewable energy. China will develop biomass energy and other renewable energy resources under the principle of "orderly development based on local conditions and comprehensive

utilization with all factors taken into consideration." It will promote power generation using crop stalks, grain-processing residues and bagasse as fuels in major producing areas of grain and cotton; and carefully develop woody biomass power generation in forest-covered areas. Attention will be given to the promotion of electricity generation by means of waste incineration and landfill gas in urban areas. The country will also speed up the construction of biomass gas, including methane, supply systems in eligible regions, and build production bases of biomass molding fuel in accordance with local conditions. Efforts will also be made to develop biodiesel and industrial cellulosic ethanol. China will spread the technology of efficiently using geothermal energy on the condition that underground water is protected. It will reinforce the tracking and R&D of electricity generation technologies by using tidal energy, wave energy and hot dry rocks.

-- Promoting distributed utilization of clean energy. China will energetically develop distributed energy resources on the principle of "giving priority to local supply, feeding the surplus into the grid, development based on local conditions, and advancing in an orderly way." It will accelerate the construction of distributed energy systems (DES) for natural gas at energy load centers. It will energetically spread the technology of distributed renewable energy, especially in high energy-consumption centers, including cities and industrial parks. It will carry out distributed renewable energy construction in rural areas, forest regions and islands in accordance with local conditions. Efforts will be made to set standards for distributed energy, and improve the formation mechanism and polices for on-grid price. Hard work will be done to realize direct supply, and non-discriminatory and barrier-free connection to the grid of power generated in the distributed manner. During the 12th Five-Year Plan period, China will construct about 1,000 projects of natural gas DES, and ten distributed energy demonstration areas with various typical characteristics.

V. Promoting Clean Development of Fossil Energy

Worldwide, fossil energy, including coal and oil, will continue to play a dominant role in energy supply for a long time to come. China is no exception. Therefore, China will continue to plan fossil exploitation and utilization, with environmental protection taken into account. It will speed up the construction of advanced production capacity, eliminate outdated capacity, push forward the clean development of fossil energy, protect the ecological environment and cope with climate change, so as to attain the goal of energy conservation and emission reduction.

-- Developing the coal industry in a safe and highly efficient way. China sticks to the guideline of "scientific overall arrangement, intensive development, safe production, efficient utilization and environmental protection" in the development of the coal industry. Following the principle of "enforcing control in the eastern regions,

maintaining stability in the central regions, and promoting development in the western regions," it will push ahead with the building of 14 large coal-mining bases, including the Shaanbei, Huanglong and Shendong coalfields. By means of integration of coal resources, and merger and reorganization of coal mining enterprises, the country will bring into being large coal mining conglomerates. Priority will be given to the development of large open-pit and super-large coal mines. It aims to enhance overall mechanization and safe production in coal mining through upgrading and reconstruction, and elimination of outdated production capacity. Vigorous efforts will be made to develop a circular economy in the mining areas, increase the washing and dressing rate of raw coal, and rationally develop associated resources. Following the approach of energy, technology and capital-intensive development with extensive industrial chain and high added value, the country will develop demonstration projects of upgraded downstream products in an orderly way. It will encourage the construction of projects for clean production, utilization, processing and conversion of low-calorific-value coal. It will strengthen environmental protection and ecological construction in the mining areas by way of comprehensive ecological management and land reclamation in mining-subsidence and other areas affected by coal-mining operations.

-- Spurring clean and highly efficient development of thermal power. Upholding the principle of low-carbon, clean and efficient development, China actively promotes green thermal power generation. It encourages coal-electricity integration, and steadily pushes forward the construction of large coal-fired power bases. It vigorously applies advanced technologies, including supercritical and ultra-supercritical power generation, in the construction of clean, highly efficient and environment-friendly coal-fired power generating sets and energy-saving power plants. It speeds up the elimination of small thermal power units marked by high energy consumption and heavy pollution. In order to strictly control pollutant emissions from coal-fired power plants, newly built coal-fired power generating sets must install dust-removing, desulfurization and denitration facilities, and the existing plants are asked to speed up their dust removal, desulfurization and denitration upgrading. It encourages the construction of thermoelectricity co-generation units in large- and medium-sized cities and industrial parks where thermal loads are relatively concentrated. It constructs combined-cycle gas-steam peak-load units and promotes heat-electricity-cooling co-generation with natural gas as fuel in accordance with local conditions. It has imposed strict restrictions on the construction of new coal-fired power generating sets in the Bohai Rim, Yangtze River Delta and Pearl River Delta areas, except those built for the purpose of "constructing large units and restricting small ones" and co-generation. Intensified efforts have been made to spread water-saving technology in thermal power plants. It develops the integrated gasification combined cycle power generation, and demonstration projects of carbon capture, utilization and storage.

-- Intensified efforts in prospecting and exploitation of conventional oil and gas resources. China will continue to implement the policy of "simultaneous development of oil and gas," with the target of stabilization in the east, acceleration in the west, development in the south and exploitation in the offshore areas. The country will steadily increase crude oil output and reserves by means of stepping up efforts in prospecting for and exploiting oil in major oil-production areas, including those in the Tarim and Ordos basins, and improving renovation for stable yields and increasing the recovery ratio in old oilfields. In its efforts to speed up the development of natural gas, the country will enhance the productivity and increase the output of natural gas in major gas fields in the central and western regions, push forward the development of offshore oil-gas fields, and gradually increase the proportion of natural gas in the primary energy structure. It will optimize the distribution of the refining industry, construct some large refining and chemical bases, and establish three major refining cluster areas in the Bohai Rim, Yangtze River Delta and Pearl River Delta, so as to realize upstream and downstream integration, refining and chemicals integration, and refining-reserve integrated management.

-- Actively promoting the development and utilization of non-conventional oil and gas resources. China's efforts to expedite the development of non-conventional oil and gas resources are an important way to enhance its security of energy supply. It will speed up the exploration and exploitation of coal-bed gas, increase the proven geological reserves, and push forward the construction of industrial bases in the Qinshui Basin and eastern edge of the Ordos Basin. In order to accelerate the development of shale gas, the country will select a group of prospective areas and favorable exploration target areas, intensify efforts to solve difficulties in core technology, set up a new development mechanism, implement incentive polices for the shale gas industry, and improve supporting facilities. China aims to increase its annual output of shale gas to 6.5 billion cu m by 2015, and lay a solid foundation for the future rapid development of shale gas. In addition, it will strengthen the development of shale oil, oil sand and other non-conventional oil and gas resources.

-- Enhancing the construction of energy storage and transportation facilities. When making a plan for the construction of energy output channels, China takes many factors into consideration, including target market, industrial restructuring, construction of plants that rely on coal, wind, nuclear energy, natural gas and pumped storage for electricity generation, imported energy resources, and bearing capacity of local water resources and the ecological environment. It will increase the cross-regional coal transport capacity through technological renovation of existing railway lines, construction of new coal-transport channels, and building of supporting piers. It will expand the scope of power transmission from western to eastern China and from northern to southern China, strengthen the building of regional power grids, improve the technology of ultra-high voltage transmission, and enhance the grids'

ability to optimize resource allocation. The country will expedite the construction of networks of crude oil, product oil and natural gas pipelines, increase the proportion of oil and gas transported by pipelines, improve regional networks of oil and gas pipelines, and build large coastal loading and unloading stations. It will strictly enforce laws and regulations concerning the protection of oil and gas pipelines to ensure their safe operation. China will balance its resource reserves, both state reserves and commercial reserves, enhance its ability to extend emergency support, and improve the reserve system of crude oil, product oil, natural gas and coal. Efforts will also be made to enhance the peak-shaving ability of natural gas, and build and improve coal peak-shaving reserves.

VI. Improving Universal Energy Service

The fundamental objective of China's energy development is to guarantee and improve the livelihood of its people. China makes great efforts to equalize access to basic energy service for its entire population. It balances the energy development in both urban and rural areas, enhances energy infrastructure and improves the energy conditions in the vast rural and border areas and areas inhabited by ethnic minorities in compact communities, so that energy development can benefit all Chinese people.

-- Providing universal access to electric power. In order to provide the people who have no access to electricity yet in the Tibet, Xinjiang Uygur and Inner Mongolia autonomous regions, as well as Qinghai, Yunnan and Sichuan provinces with electric power, the Chinese government increases investment to expand the coverage of the power grids and develop distributed renewable energy sources. In areas without grid connection, China establishes and completes the universal electric service system. By 2015, most of the people who at present don't have electricity in China will gain access to it.

-- Boosting energy development in rural areas. Energy development in rural areas is of great significance for the betterment of farmers' living standards and modern agricultural progress. Adhering to the principle of comprehensive and effective utilization of diverse energy sources according to local conditions, China increases financial input in energy infrastructure in rural areas and ameliorates rural energy management and services. It upgrades rural power grids to improve electric power conditions for rural life and production, and hence establish new-type rural power grids, which, backed by advanced technology and management, are safe, reliable, efficient and eco-friendly. The Chinese government will put great efforts into developing renewable energy sources in rural areas, and launch various green energy demonstration projects in accordance with local conditions. By 2015, a total of 200 green-energy counties and 1,000 villages using solar energy will be set up as examples. China rebuilds old hydropower stations in rural areas to increase their

capacity and efficiency. It accelerates the electrification of hydropower-based rural areas, and builds more small-sized hydropower stations, so as to get rid of the use of wood as fuel in some rural areas. In addition, the Chinese government promotes the use of solar water heaters around the country.

-- Enhancing energy development in border regions. Since 1978, when China launched its reform and opening-up drive, great progress has been witnessed in both the society and economy of the country's border regions. However, the energy conditions in these areas, despite great improvement that has been made, still lag far behind the eastern and central regions. The Chinese government will appropriate financial funds to improve energy infrastructure and build energy projects that have a direct bearing on the people's livelihood in the border regions, especially in Tibet and Xinjiang, to support leapfrogging development there. It will accelerate the electrical grid construction in Tibet and Xinjiang as well as the Tibetan-inhabited areas in Qinghai, Sichuan, Yunnan and Gansu provinces, enlarge the coverage of the distribution grid, and strengthen the reliability of power supply. The government will draw up and implement the "Tibet Energy Development Program," and provide extra funding to Tibet for its electric power development - the direct investment during the 12th Five-Year Plan period to exceed 900 million yuan. The energy projects to improve the people' s livelihood, such as the "Electrification of Southern Xinjiang" and "Electrification of Northern Xinjiang," will be sped up. The state will press on with the project to connect Xinjiang power grid to the northwest China grid so as to form an energy channel as soon as possible to get Xinjiang' s redundant electric power transmitted to other parts of China to generate more funds for the development of Xinjiang. The government will build a group of solar power and solar-wind hybrid power plants in the farming and herding areas far from towns to improve the quality of life of the farmers and herdsmen there.

-- Improving energy conditions in urban areas. The Chinese government will upgrade the urban grids to raise the quality and reliability of power supply in urban areas. It guarantees urban power supply, especially household electricity consumption. The state accelerates natural gas development. Natural gas supply networks will be built or improved in cities so that more urban residents will gain access to natural gas. In northern cities, where the district heating system is applied, the government will develop co-generation units based on local conditions to improve the heating quality.

VII. Accelerating Progress of Energy Technology

China's energy technology has developed rapidly since the country launched the reform and opening-up program in late 1978, and has played an increasingly significant role in energy conservation, emission reduction, energy structure optimization and energy security. However, China still lags behind the developed

countries in this field, particularly marked by its flimsy basis for independent innovation, backwardness in core technology, and dependence on imports for some key technologies and equipment. Therefore, the Chinese government will attach more importance to technological innovation. It will establish and complete at full speed an energy technology innovation system that suits China's reality, and combines efforts of enterprises, colleges and research institutes. The National Energy Technology Program During the 12th Five-Year Plan Period, issued in 2011 as China's first scheme to improve its energy technology, has outlined the four key aspects of China's energy technology, namely, exploration and exploitation; processing and conversion; power generation, transmission and distribution; and new energy. The program also contains an overall plan to build a national energy technology innovation system that integrates research into key technology, manufacturing of key equipment, key demonstration projects and a technological innovation platform.

-- Reinforcing energy technology R&D. China will launch a series of strategic and advanced research projects on frontier technologies in basic sciences like geology, materials, environmental studies, power and energy, and information and control, with the aim of making breakthroughs in basic energy sciences. The Chinese government encourages major enterprises and research institutes in the industry to carry out studies in advanced and adaptive technologies, and put them into practical use, like high-efficiency and intensive coal mining technology, exploration and development technology of unconventional oil and gas resources, high-efficiency clean technology, offshore wind power technology, solar thermal power technology, advanced oil and gas storage and transportation technology, and high-capacity, high-efficiency and long-distance power transmission technology. China will press on with the two national high-tech programs -- "large oil-gas fields and coal-bed gas development," and "large and advanced pressurized-water reactor and high temperature gas-cooled reactor nuclear power stations" -- to facilitate key technological innovations, and enhance the innovation abilities, including "original innovation," "integrated innovation" and "secondary innovation" in the energy sector.

-- Promoting progress of energy equipment technology. Based on major technological equipment projects, China strives to make technological breakthroughs, improve supporting facilities, set up and enforce technical standards for energy equipment, establish a complete testing and certification system, and raise its ability for energy equipment design, manufacturing and system integration. China will further enhance the supporting policy system, boost the technological advance of key equipment, such as high-capacity, high-parameter and ultra-supercritical generating units, gas turbines, third-generation nuclear power, renewable energy generating units, exploration and development of unconventional oil and gas resources, and spreading the application of state-of-the-art equipment. The government will also strengthen planning and

guidance for the energy equipment manufacturing industry to prevent redundant construction.

-- Launching major technological demonstration projects. Centering on the transformation of energy development mode and upgrading of the energy industry, the Chinese government will give more support in funding, technology and policy to launch major demonstration projects in such fields as large pressurized-water reactors, high-temperature gas-cooled reactors, development and utilization of coal-bed gas, exploration and development of shale gas, and deep processing of coal, energy storage and smart power grids, thus promoting the application of technological and scientific research achievements in production.

-- Improving the innovation system of energy technology. The Chinese government will continue to support large enterprises, R&D institutes, colleges and universities to set up national innovation platforms that can conduct independent R&D and make breakthroughs in core technologies, especially technologies for coal exploration, development and utilization of coal-bed gas, exploration and development of shale gas, marine engineering equipment, high-capacity high-efficiency and low-pollution power generating equipment, smart grids and advanced nuclear reactors. It will improve the policy system supporting technological innovation platforms. The government will give full play to the role of enterprises in innovation, and encourage them to spread and apply innovative technologies. It will guide R&D institutes and institutions of higher learning to serve enterprises in the field of innovation, and better integrate the efforts of enterprises with that of the research institutes and institutions of higher learning. The state will set up an evaluation and reward mechanism for technological development, and establish and improve a training system and an incentive mechanism for innovations.

VIII. Deepening Institutional Reform in the Energy Sector

Reform constitutes a strong dynamic force in accelerating the transformation of the development mode. China will resolutely implement reform in the energy sector, strengthen top design and overall planning, accelerate the pace of building a system and mechanism for the scientific development of the energy industry, ameliorate the environment for energy development, bring about a revolution in energy production and utilization, and safeguard China's energy security.

-- Accelerating building of legal regime for the energy sector. China will improve its energy-related legal regime to regulate the energy market, protect the ecological environment and guarantee energy security. China attaches great importance to energy legislation and will press on with the improvement of the legal system related to the energy sector. Now, work has been going on an energy law, as well as a series of administrative regulations on oil reserves, protection of submarine oil and natural

gas pipelines, and nuclear power station management. It has amended the Coal Industry Law, the Electric Power Law and other laws, and has been making efforts to promote the enactment of laws concerning oil, natural gas and nuclear energy.

-- Improving the market mechanism. China is actively promoting market-oriented reform in the energy sector by giving full play to the fundamental role of the market in the allocation of resources. All projects listed in the national energy program, unless forbidden by laws or regulations, are open to private capital. The Chinese government encourages private capital to participate in the exploration and development of energy resources, oil and natural gas pipeline network construction and the electric power industry, encourages the involvement of private capital in coal processing and oil refining, and supports the entry of private capital into the new energy and renewable energy fields. The Chinese government will intensify and regulate the administration of coal exploration and development rights, gradually eliminate the double-track price system for contracted coal supply and market coal supply, and create a mechanism to balance the development of coal and coal-bed gas. The government will press on with institutional reform in the power sector and steadily carry out trials to separate power transmission from power distribution. Proactive efforts will be made in the pricing mechanism of electricity to gradually let the market decide the prices of electricity generated and marketed, while the prices of transmission and distribution are to be decided by the government. The state will regulate the prices of coal for electricity generation and prices of electricity marketed, and explore ways to set up a renewable energy trading mechanism. It has successfully implemented the price, tax and fee reform of refined oil products and guides the public's rational energy consumption through tax means. It will continuously rationalize the refined oil price and form a pricing mechanism, and start the experimental reform of natural gas pricing mechanism. It will improve the market system for energy and develop more forms of trade, including spot trade, long-term contracts and futures trade.

-- Tightening administration of the energy sector. In order to increase the efficiency of energy development and utilization, promote the scientific development of the energy sector and safeguard the country's energy security, China is determined to strengthen administration in the energy sector. It takes strategic planning and macro-control for energy development, and carries out industry regulation by making use of plans, policies and standards. The Chinese government will reduce its intervention in specific matters and simplify administrative examination and approval, while intensify supervision over monopoly and unfair competition by establishing an open, fair, scientific and effective supervision mechanism. It will strengthen statistics collection and forecasts related to the energy sector, and establish a comprehensive system covering statistics, monitoring, forecasting and early warning in this regard.

IX. Strengthening International Cooperation in Energy

China's development cannot be achieved without cooperation with the rest of the world, and the prosperity of the world has need of China as well. With accelerating economic globalization, China has forged increasingly closer ties with the rest of the world in the field of energy. China's development of energy has not only satisfied its own needs for economic and social progress, but also made great contributions to world energy security and global market stability.

China is an active and responsible participant in international energy cooperation, and it has established bilateral dialogue and cooperative mechanisms in the field of energy with the US, the EU, Japan, Russia, Kazakhstan, Turkmenistan, Uzbekistan, Brazil, Argentina, Venezuela and many other countries and regions, and has strengthened dialogues, exchanges and cooperation with these countries regarding oil, natural gas, coal, electric power, renewable energy, technology, equipment and energy policy. China is also a member of or important participant in many multilateral organizations and mechanisms, including the energy working group of the Asia-Pacific Economic Cooperation Organization, Group of 20, Shanghai Cooperation Organization, World Energy Council and International Energy Forum. It is an observer of the Energy Charter, and maintains close relations with such international organizations as the World Energy Agency and the Organization of Petroleum-Exporting Countries. In international energy cooperation, China assumes a wide range of obligations and plays an active and constructive role.

China upholds a policy of opening to the rest of the world in the field of energy. To provide a favorable environment for foreign investment and protect the legitimate rights and interests of investors, it has promulgated a series of laws and regulations in succession, like the Law on Sino-foreign Equity Joint Ventures, Law on Sino-foreign Cooperative Joint Ventures and Law on Foreign Investment Enterprises, and framed such policy documents as the Catalogue of Industries for Guiding Foreign Investment and the Catalogue of Advantageous Industries for Foreign Investment in the Central and Western Regions. The Chinese government encourages foreign investment to engage in the exploration and development of oil, natural gas and unconventional oil and gas resources, such as shale gas and coal-bed gas, by way of cooperation; invites foreign investment in the building of new-energy power stations, hydroelectric power stations, clean-combustion power stations, and nuclear power stations as long as the Chinese partners have control; and supports multinational energy corporations to set up R&D centers in China.

Following the principle of equality, mutual benefits and reciprocity, Chinese energy enterprises are actively involved in international energy cooperation, participating in overseas energy infrastructure projects and expanding cooperation in energy

engineering and services. Ninety percent of Chinese enterprise-invested energy resources abroad are sold locally, thus increasing and diversifying supplies in the global energy market. When investing in foreign countries, Chinese energy enterprises abide by local laws and regulations, and respect the religious beliefs and customs of the local people. They actively make contributions to local economic and social development while achieving self-growth.

For a fairly long time to come, international energy trade will remain the major way by which China utilizes foreign energy sources. China will improve policies for fair trade and optimize the trade structure, and conduct energy imports and exports in accordance with the WTO rules. It will diversify the modes of trade and comprehensively use such methods as futures trade, long-term agreements, entrepot and barter trade. China will actively participate in global energy management. It will intensify exchanges and cooperation with other countries, addressing together the impact of the international monetary system, excessive speculation and energy market monopoly, thereby maintaining the stability of international energy market and energy price.

Energy is of vital importance to economic development and people's well-being. In order to reduce conflicts and inequality brought about over access to energy resources, achieve a stable growth of the world economy and make the economic globalization lead to a balanced, universally beneficial and win-win development, the international community should foster a new energy security concept featuring mutually beneficial cooperation, diversified development and common energy security through coordination. To jointly ensure global energy security, the Chinese government calls for international efforts in the following three aspects:

-- Strengthening dialogues and exchanges. Strengthening dialogue and communication among energy exporting, consuming and transiting countries is the foundation of international energy cooperation. The international community should further cement its bilateral and multilateral ties; increase dialogues and exchanges in the fields of efficient use of energy, energy conservation, environmental protection, energy management and energy policy; promote monitoring and emergency response mechanisms for the global energy market; and deepen the cooperation in the fields of information exchanges, personnel training and coordination.

-- Carrying out effective energy cooperation. Upholding the principles of reciprocity, mutual benefit and common development, the various countries should ensure mutually beneficial cooperation in international energy resources exploration, enrich and improve cooperative mechanisms and methods, increase the international energy supply, and diversify supply channels. They should work together to stabilize the prices of bulk energy commodities, secure the energy needs of various countries, and

maintain the normal order of the energy market. For the sake of sustainable development, the developed countries should actively provide and transfer clean and highly efficient energy technology to developing and underdeveloped countries and together promote green development globally on the condition that intellectual property rights are protected. The international community should strive hand in hand to help the least-developed countries to eliminate energy poverty, increase energy services and promote sustainable development.

-- Working together to maintain energy security. A fair and rational international energy management mechanism is a prerequisite for a stable global energy market. The international community should work collaboratively to maintain stability in oil producing and exporting countries, especially those in the Middle East, to ensure the security of international energy transport routes and avoid geopolitical conflicts that affect the world's energy supply. The various countries involved should settle major international energy disputes through dialogue and consultation. Energy issues should not be politicized, and the use of force and armed confrontation should be avoided.

Conclusion

Energy is the vital material base for China to modernize and build a moderately prosperous society. The Chinese government will strive to address the energy problem properly by following the sustainable road of energy development.

China will still be in a stage featuring accelerated industrialization and urbanization for a long time to come, facing the challenging tasks of developing its economy and improving its people's livelihood. Its energy needs will go on to increase in the future. As a large developing country with a population of over 1.3 billion, China must rely on itself to increase the energy supply steadily to satisfy such demands.

Energy security is a global issue. Few countries can secure their energy supply without international cooperation. The achievements China has made in energy development are inseparable from its friendly cooperation with other countries. Its future development in the energy sector will need more understanding and support from the international community. China, with a population of more than one billion, is exploring and practicing a new way in the history of energy development to ensure its sustainable energy development. China did not, does not and will not pose any threat to the world's energy security. Abiding by the principle of equality, reciprocity and mutual benefit, it will further strengthen its cooperation with other energy producing and consuming countries as well as international energy organizations, and work together with them to promote a sustainable energy development around the world. It will strive to maintain stability of the international energy market and energy prices, secure the international energy transportation routes, and make due

contributions to safeguarding international energy security and addressing global climate change.