Global Energy Conservation and Emission Reduction by Using China's Technology ——Shenwu Group on the Green Silk Road

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1. Shenwu Group – Mastering Core Technology of Energy Conservation and Emission Reduction (ECER)

Beijing Shen wu Environment & Energy Technology Corporation (Shen wu Group), founded in 1996, is a solution provider for energy conservation and environmental protection technology of global fossil resources and low carbon emission technology. Shen wu Group is one of the largest enterprises in China specialized in high efficient and clean utilization of fossil resources, mineral resources and renewable resources, and in R&D and technology promotion of new technologies.Currently Shenwu owns nine wholly-owned and holding subsidiaries, two of them are China A-share companies.

Mastering Core ECER Technology. Regenerative high temperature air combustion technologyinnovated by Shenwu is known as the third generation combustion technology in the world, which is being successfully applied in steel, metallurgical, petrochemical, coal chemical, solid wasterecycling and power industries and other key industrial fields in the national economy. Shenwu Group has made many great breakthroughs in 26 high-efficient and energy conservation technologies and equipments. With regenerative combustion technology, Shenwu Group has integrated it with low and medium rank coal upgrading, coal chemical via acetylene, inferior iron ore metallurgy by direct reduction, household waste comprehensive utilization, coal fast pyrolysis in a systematic and innovative way. The combination of these new technologies has changed the conventional patterns for utilizing fossil energy, ore resources and renewable resources, and also provided a new way to highly improve energy utilization efficiency, reduce or eliminate air pollutants emission and lower raw material and production cost.

Taking Innovation as Life. Shenwu Group has been committed to R&D of energy-saving combustion technologies in various fields in 20 years, and already set up three unique platforms with a strong global competence. 1,A world-wide leading pilot plants in energy conservation and carbon emission technologies, which consisting of 18 sets of demonstrative equipment, occupying 150,000 square meters. 2, Shenwu Group owns China Class A accreditation for engineering design, consultancy and EPC to quickly transform process design package into industrial plantin metallurgical,

petrochemical and industrial furnace fields.3,A large-scale manufacturing base for the core equipment. With this platform, Shenwu Group could fabricate core equipment with high quality. These three platforms formed a strong capability for Shenwu to carry out technology innovation and transformation.

Taking ECER as a Mission.Similar to other countries, China is featured with energy and resources shortage but high demand, energy efficiency improvement and energy saving are important to national energy security, while reducing greenhouse gas emission and coping with climate change are related to people's living conditions. The production of steel in China accounts for half of the world, and coal makes up above 60% in primary energy consumption structure in China. Thus innovative technologies have to be adopted to improve conventional energy utilization and to reduce air pollutantion in order to solve the problem in energy and industrial production. Since 1996, Shenwu Group has applied burner-type regenerative combustion technology in reheating furnace, heat treatment furnace and other industrial furnaces. Through decade long efforts, Shenwu has rebuilt or transformed various industrial furnaces amounting to 55% of those of the steel industry. By this technology, it has saved 30 million tons of standard coal reduced 60 million tons of CO2 emission , lowered 0.5% burn out rate of billet oxidization, and saved over 10% of production cost for steel companiesyearly.

2. Providing Technical Support and Integrated Solution to Build a Green Silk Road

Taking "The Belt and Road" initiative and relevant infrastructure investment projects certainly will bring new development opportunities and driving force to industries of coal, steel, non-ferrous metal, chemical and environmental protection in the areas where covered, and accelerate Shenwu's ECER technology commercialization in this capacious market as well.

A Pioneer for Energy Conservation and Environmental Protection Industry on the Silk Road. So far Shenwu Group has carried out a number of cooperation projects along "The Belt and Road" such as industrial ECER technology and comprehensive resource utilization projects implemented in India, Iran, Indonesia and etc. Shenwu's ECER solution and Regenerative High Temperature Air Combustion technology has been applied in India TATA Group years ago, the technology realized using blast furnace coal gas as heating material for heating furnace instead of coke oven gas for the first time in Indian steel metallurgy history, and it is feasible to utilize Indian plentiful low grade iron ore and coal reserves efficiently and economically, accordingly brought good news to Indian steel industry for ECER reforming. The EPC contract for nickel laterite treatment project signed between Shenwu Group and Solway Group has provided a brand new industrial route and solution for high efficiency nickel laterite ore treatment and comprehensive resource utilization. In engineering service field, Shenwu international business has been successfully expanded to Iran, Turkey, Saudi Arabia, Jordan, Egypt, India, Pakistan, Malaysia, Thailand, Vietnam, Sweden, Nigeria, Niger etc.

Promoting Industry Upgrading and Renovation along the Silk Road. Shenwu Group is able to integrate its latest technologies with relevant industries in the areas and support the industries to reach world leading level in field of ECER. Shenwu has taken advantage of Rotary Hearth Furnace Direct Reduction technology and signed a contract with Shasteel Group– A Fortune Top 500 Company, for a project of 300,000 TPY metallurgical dust and sludge recovery via RHF direct reduction process, and achieving reduction and separation of iron, zinc, sodium and potassium from the dust and sludge at low cost, and then realized effective recycling and utilization of nonferrous and ferrous industrial solid waste resource; Since Shenwu technology applied in Shasteel for its industry upgrading and renovation, in dust treatment process the noble metals recovery has been improved, and issue of zinc dust erosion in blast furnace has been resolved, accordingly lifetime of iron making blast furnace is prolonged, what is more, the technology also achieved 3 years payback period at annual profit of 90 Million of RMB.

Co-investing and Cooperating and Mutual Benefiting. Shenwu Group has carried out investment on industrial entity in relevant fields based on its world leading technologies with proprietary

intellectual property rights, for example, the first “comprehensive copper slag utilizing project” worldwide was set up and invested jointly by Shenwu and Jinchuan Nonferrous Group, the biggest national owned enterprise in Gansu province and one of fortune 500 companies, the project has a production capacity of 800,000 TPY, producing 276,000 tons of reduction iron powder agglomerates, 34,000 tons of oxidized zinc powder and 449,000 tons of steam annually. The project will achieve an annual sale of 670 Million RMB and annual profit tax paid of 200 Million RMB. The project will become a great model for heavy industries and chemical enterprises located in countries along the line of the Silk Road for achieving good results of circular economy, environment protection, ECER.

3. The Ways of Shenwu Cooperation in Building Green Silk Road

The Belt and Roadcountries own rich fossil energy and mineral resources which are global major suppliers in energy and strategic resources. In energy conservation and environmental protection of chemical industry, metallurgy, energy and others, there are many cooperation opportunities in term of economical and technical cooperation.

Route 1,Through project of Shenwu acetylene– ethylene new technology. With this technology, Shenwu is constructing a 400,000 TPY Polyethylene project in Xinjiang, China. The project will be the first demonstration project for ethylene production via acetylene with Shenwu technology rather than traditional petrochemical, natural gas and MTO route. Presently, adopting acetylene – ethylene new technology from Shenwu, many projects are being executed along “The Belt and Road” such as 800,000 TPY Polyethylene project in Baotou, 400,000 TPY Polyethylene project in Gansu, 400,000 TPY Polyethylene project in Wuhai, Inner Mongolia.

Route 2, Through project of high efficient clean and smelting technology for low grade ferrous, nonferrous and refractory ores. The Belt and Road countries and regions are rich in metal mineral resources, and have tremendous potential in nonferrous and ferrous metallurgy industry. For instance, Xinjiang, Kazakhstan and other areas own luxuriant V-Ti magnetite. Southeast Asian countries such as Indonesia, Philippines, Vietnam and others have great vanadium titanium sand resources and low grade of nickel lateritic resources. However, these industries will cause many hidden problems in environmental protection. Shenwu owns various high efficient clean and smelting new technologies for ferrous and nonferrous metals. Without coking, sintering and high blast furnace of such high consumption and pollution process, normal coal is used as raw material. Comparing to traditional method, this way can reduce smelting energy and pollutant emission significantly, suitable for processing various low grade refractory ores, composite iron ores, and different kinds of slag in metallurgical industry.

Route 3,Oil and gas extracting form coal for power generation. Shenwu developed several coal rapid pyrolysis technologies to extract oil and gas from low rank coal. By this technology, oil and gas extracted from the coal can be used in power generation further decrease the cost of productionand the emission of NOx and SOx. At the present, along “The Belt and Road”, the new power plant projects implemented by Shenwu group consist: 2 Lines of 350MW cogeneration in Xinjiang, 2 Lines of 350MW cogeneration in Inner Mongolia, 2 Lines of 660MW power generation for Huadian Corporation in Mongolia.

Upcoming Paris Convention on Climate Change by the end of this year will formulate a new plan to handle climate change and point the direction of green low carbon development for international community. Implementing green low carbon development strategy and actively coping with climate change will bring great opportunities for the countries along Silk Road. It can be seen that Shenwu will succeed together with global outstanding enterprises under the spirit of Silk Road. Shenwu will make great development under this great initiative and great roadmap of “The Belt and Road”. Shenwu Group hopes to promote and lead the direction of new energy and industry revolution in the world with the help of its independently innovative novel energy conservation and environmental protection technologies.