

# Hangzhou Pump' s Energy Saving Technology for Circulating Water Systems

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## Recommendations for Dissemination



Beijing Energy Club  
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## **Recommendations on Dissemination of Hangzhou Pump's Energy Saving Technology for Circulating Water Systems**

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Beijing Energy Club<sup>1</sup>

In recent years, with the accelerated industrialization and urbanization, China faces increasingly serious environmental issues and quite rigorous situation of energy conservation and emission reduction. At present, the total energy consumption in China reaches 4.3 billion tons, and the energy consumption per unit of GDP is higher than the world average and over 2 times of that of developed countries. The emission of main pollutants exceeds the environmental carrying capacity, and both of the total and per capita carbon emissions exceed the world average. Strengthening the work of energy conservation and emission reduction is not only the continuous improvements in the understanding of the social development of human being, but also the urgent need for actively dealing with the global climate change. This is a strategy choice to establish the image of responsible great power and take the new path of industrialization.

Energy conservation by technical measures is an important means to strengthen the energy conservation and emission reduction, and an inevitable choice to break the environmental constraints of energy resources, fulfill the responsibility of energy conservation and emission reduction, and take the new path of industrialization with Chinese characteristics. In recent years, with the vigorous promotion of green and low carbon worldwide, the application of high efficiency and energy conservation technology has ushered in a broad space.

The circulating water systems (CWSs) are to reduce the heat generated in production process (equipment) in operation through heat exchange. CWSs are an indispensable and important part of industrial economy and other social sectors. There are a lot of CWSs, including those for industrial cooling and those for central air conditioning cooling and refrigeration. CWSs are extensively configured in chemical industries, metallurgical industries, cogeneration industries, and civil public facilities. The power consumption capacity accounts for nearly 8% of the power generation capacity in the national economy, and nearly 11% of power consumption in the industrial economy.

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<sup>1</sup> Disclaimer: This Report has been prepared on the basis of the information that the Secretariat of Beijing Energy Club (BEC) has at its hand, the materials supplied by Hangzhou Pump Energy Conservation Technology Co., Ltd. and the discussions from the Technology Assessment & Dissemination on Jul. 2<sup>nd</sup>, 2016. BEC shall not be held responsible for any risks, losses, damages, costs or expenditures, claims, and/or any other rights of claim that may arise from any investment or other business decisions made by any business organizations or individuals in accordance with the conclusional comments contained in this Report.

At present, issues are common in the field of CWSs in China. Firstly, there is a mismatch between the design working condition of CWSs and the enterprise process requirements. In most cases, CWSs have higher power consumption in the actual operation. Secondly, the operating efficiency of CWSs is not high. According to statistics, the equipment efficiency of CWSs in China is 5% less than that in developed countries, the system operating efficiency is 10% lower, and the energy utilization efficiency is seriously lagged compared with that of developed countries. Thirdly, the operation management of CWSs is extensive. In most companies, instances are not rare of focus on construction and production while ignoring management and supporting facilities as well as unscientific and unsound management systems and energy consumption assessment system. These issues have caused serious water waste and power consumption in CWSs. Therefore, there is a great space for the efficiency of CWSs to grow.

Currently, thanks to such energy conservation technologies for CWSs as single frequency conversion and energy conservation technology, hydraulic turbine technology and impeller cutting technology, the efficiency of CWSs is improved. But since these technologies are of part improvement of the unit, the energy conservation potential of CWSs has not been tapped fully. Therefore, CWSs should be developed towards the ones with high efficiency and energy conservation technology in the future. Vigorously promoting the high efficiency and energy conservation technology for CWSs will be beneficial to solving the problem of large energy consumption and low energy efficiency of CWSs.

Chinese government attaches great importance to the work of energy conservation. The first is that the assessment requirements are strict. During the 11<sup>th</sup> Five Year Plan Period in China, Top 1,000-enterprises energy conservation program was implemented. During the 12<sup>th</sup> Five Year Plan Period, Top 10,000-enterprises energy conservation and low carbon program was implemented to decompose the energy conservation index to companies and carry out the assessment. The second is to vigorously promote the high efficiency and energy conservation technology. The National Development and Reform Commission released *Catalog for Promoting the National Key Energy Conservation Technologies* from 2008. Till now, 699 high efficiency and energy conservation technologies in 8 batches have been released. In 2012, the Ministry of Industry and Information Technology of the People's Republic of China had screened more than 600 advanced and applicable technologies for energy conservation and emission reduction in 11 industries such as iron and steel, petrochemical, nonferrous metal and others. The Ministry of Science and Technology of the People's Republic of China also passed through major and special projects to extend energy conservation technologies in China. The third is to promote major energy conservation projects. In the *Plan of Energy Conservation and Emission Reduction during 12th Five Year Plan Period*, the State Council proposed the ten major projects of energy conservation and emission reduction, including energy conservation improvement project, people-benefit project for energy conservation product, promotion project for contract energy management, industrialization demonstration project of energy conservation technology, and so on. The fourth is that China vigorously supports energy conservation projects. The *Regulations on the Implementation of the Enterprise Income Tax Law of the People's Republic of China* proposed that the company with energy conservation and water conservation projects can obtain the preferential of three-year exemption and three-year half payment that the tax will be exempted in the first three years and collected a half in the last three

years from the year that the project had obtained the income tax from the first production and business. In 2010, the Ministry of Finance had issued *Interim Measures for the Administration of Financial Incentive Fund for Contract Energy Management Project* to provide appropriate incentives for contract energy management projects.

On July 2, 2016, TAD (Technology Assessment and Dissemination) of Beijing Energy Club chose Hangzhou Pump's high efficiency and energy conservation technology for CWSs to carry out assessment and dissemination. Six experts including Mr. Mao Jiayang, Vice President of Sinopec Institute of Economic Technology; Mr. Bai Rongchun, former director of State Economic and Trade Commission Energy-Saving Department and former Inspector of NDRC Energy Bureau; Mr. Liu Wenqiang, deputy director of CCID Research Institute of Ministry of Industry and Information Technology of the People's Republic of China, Mr. Zhihui, Secretary General of China Industrial Energy Conservation and Clean Production Association, Mr. Zhai Yongping, General Counsel on Energy Technology of Asian Development Bank; and Mr. Chen Xiaohua, Chief Engineer in French Veolia Water Service China Office had participated in the assessment. Mr. Fu Chengyu, former chairman of Sinopec Group as well as honorary vice chairman of the council of Beijing Energy Club, also attended the whole event and made the opening and concluding remarks.

At the meeting, Mr. Fan Changhai, chief engineer of Hangzhou Pump and the patented technology inventor, and Mr. Yang Qingkun, technical manager introduced high efficiency and energy conservation technology for CWSs developed independently by Hangzhou Pump; Mr. Hu Weijun, director of Manufacturing Department of Shanghai Sinopec Mitsui Chemicals Co., Ltd., and Mr. Cheng Dongzhao, deputy general manager of Henan Puyang Longyu Chemical Co., Ltd. described the application of Hangzhou Pump's high efficiency and energy conservation technology for CWSs in their companies respectively. On this basis a heated discussion was carried out.

These experts had assessed the high efficiency and energy conservation technology for CWSs from four aspects such as technical advancement, market potential, policy environment and health and safety environment protection (with advanced technology, huge market, and policy support, Hangzhou Pump's energy conservation technology for CWSs can seek both temporary and permanent solutions). They also proposed the following suggestions for further dissemination of the high efficiency and energy conservation technology for CWSs.

## **I. Policy Recommendations at National and Governmental Levels**

The first is to strengthen the source control of energy consumption and grasp the technical energy conservation. At present, the national policies focus on end treatments. Once there is any pollution, it is very difficult to control. Therefore, it is necessary to vigorously promote the clean production so as to change from the end treatment to the source prevention. Saving one kWh of power on the side of power consumption is equivalent to saving the coal consumption of 3 kWh on the side of power generation. Grasping the energy conservation technology will improve the energy efficiency, decrease the energy consumption, reduce the emission of pollution and carbon dioxide from the source, and bring economic and environmental benefits for a long period.

The second is to attach great importance to the screening and dissemination of energy conservation technology. At present, the screening of energy conservation technology mainly relies on experts' reviews. The government should organize to research and develop assessment methods for scientific and rigorous energy conservation technology to screen the high efficiency and energy conservation technology. National relevant departments had issued a large amount of energy conservation technologies. The result is not optimistic. During the latter period, it should track the dissemination and application of high efficiency and energy conservation technology, develop solutions, and implement and promote technologies strictly.

The third is to reform the financial subsidy policy of energy conservation project. At present, although there are multiple subsidy policies for energy conservation projects, such problems of false report and subsidy cheat are serious. Hence, subsidies cannot substantively solve the problems in disseminating energy conservation technology. The dissemination of energy conservation technology should mainly rely on market mechanism. Governments may consider the abolition of subsidies for energy conservation projects. In the view of practices in Switzerland, the potential assessment project for energy conservation is subsidized, aimed to guide the market promotion of high efficiency and energy conservation technologies.

The fourth is to foster the business mode for operation and create the investment and financing mechanism for energy conservation project. The energy conservation project has characteristics such as large existing area and smaller single project scale. The government can encourage the project with remarkable energy conservation effect, utilize the planning clean development mechanism (PCDM) and PE investment and other modes, package energy conservation projects, enhance the bank loan success rate, reduce investment and financing risks, promote investments and financings, and promote the larger and better energy conservation projects.

The fifth is to accelerate the updating of relevant industry standards and promote the technological progress. The relevant industry standards are updated slowly in China. The existing standard threshold is relatively low now. Governments should organize to speed up the upgrading of industry technology and energy consumption standards. New projects should be based on new industry technology standards. The system renovation and improvement also need the new standards as a guide to improve the technical level and promote the technological progress by improving the standards.

The sixth is to strengthen the supervision and management of bidding processes. There are many favor loopholes in the current bidding system, which lead to many unfairness and even corruption issues. We should speed up the establishment of supervision and control mechanism during the bidding process so as to realize the true fairness during the bidding process.

## **II. Suggestions for Related Industries**

The first is to integrate and optimize the single technology as well as develop the overall system solution. At present, the upgrading and improvement for CWSs mainly aim at single equipment and technology with great limitations that cannot completely solve the existing problems in CWSs. Developing the overall system solution is a development direction in the future, and Hangzhou Pump had made a beneficial exploration in this regard.

The second is to pay attention to the seasonal characteristics of cooling capacity in CWSs. The required cooling capacity of circulating water is different within four seasons in a year. The installed loads are different. During the improvement process, it should pay attention to the pump combination and matching to promote the CWSs in a state of high efficiency during most operating period so as to reduce the annual power consumption capacity.

The third is to enhance the level of automation and information technology. Promote the intelligent manufacturing, achieve the system digitization, automation and intelligent operation, improve the operational efficiency, and reduce the energy consumption. Adopt cloud computing, large data and other information technologies. Carry out data acquisition in real-time, monitor the system operation, timely feedback to customers, gradually expand the businesses to repair, maintenance and other post-event services.

The fourth is to promote energy conservation projects to achieve Three-Able objective. Energy conservation projects should refer to the Three-Able provisions of greenhouse gas emission so as to be measurable, reportable and verifiable. This can improve the transparency of energy conservation projects, which help to promote the technology and improve the success rate of bank loan and investment and financing.

The fifth is to promote the concept of overall energy conservation for CWSs. Utilize the power of the industry, and promote the energy conservation potential for CWSs and the idea of overall system energy conservation so as make the whole society pay attention to the energy conservation problem of CWSs.

### **III. Suggestions for Hangzhou Pump**

The first is to pay attention to the new packaging technology and highlight the high efficiency and energy conservation technology. Hangzhou Pump should highlight the following questions: how these three patented technologies form? What important works have been done for supporting the system optimization? What's the advancement compared with similar companies? Is there any personalized design? Is any special equipment used? What's the level of the technological energy conservation, environmental governance efficiency and emission reduction of carbon dioxide in the industry? These can help the advancement assessment on the system and are beneficial to the technology dissemination.

The second is to develop markets fully. The improvement market scale of CWSs is very large. But projects are dispersed. Hangzhou Pump has successfully done more than 400 project cases. Its technology advancement and maturity are not questioned. The next step is to utilize the technological superiority and fully tap the market potential.

The third is to assist in the dissemination technology with the administrative power of industrial associations and governments. At present, the National Development and Reform Commission has released 8 batches of technology catalogues for energy saving and emission reduction. The Ministry of Industry and Information Technology of the People's Republic of China also released more than 600 technologies in 11 industries. Hangzhou Pump should make efforts to include its technologies in the catalogues. For further dissemination of energy conservation technology, Hangzhou Pump should focus on the advantages to promote energy conservation technologies

and expand the technology influence through technical appraisal, identification and other modes.

The fourth is to give preference to large companies as customers. As a small and medium sized energy conservation service company, Hangzhou Pump should pay attention to avoiding risks in terms of customer choice. To establish a long term cooperation relationship with large customers, Hangzhou Pump should strive to enter the procurement list of large company group headquarters to facilitate the purchase of branches.

The fifth is to continuously take the cooperation mode of contract energy management. Hangzhou Pump's individual project is characterized by relatively small scale and comparatively short period of investment return. It is suitable to continuously adopt the cooperation mode of contract energy management. At the same time, Hangzhou Pump can study the innovation of business mode, package many small-scaled technical improvement projects for energy conservation, form a scale that is easy to obtain bank concession loans and low interest loans from large banks or international financial institutions, and support the up-front cost of contract energy management project.

The sixth is to promote the technology standardization work. Hangzhou Pump should carry out standardization of equipment and procedures in system optimization, and recommend them to the design institute of CWSs. These will solve the excessive energy consumption problem of CWSs from the source so as to avoid any waste from the design aspect once and for all.

The seventh is to summarize cases, integrate similar projects across China, develop standardized solutions in categories, improve the work efficiency, and reduce transaction costs.

The eighth is to cooperate with the construction departments in large companies for service development. There are strict safety and production requirements in most fields of technical improvement involved by Hangzhou Pump and the construction in such plants needs qualifications, so it is more difficult to renew and improve the system. Hangzhou Pump can consider the cooperation with the construction departments of the companies, which will simplify the work process and improve the work efficiency.

#### **IV. Recommendations for End Users**

CWSs are extensively configured in chemical industries (including petrochemical, coal-based chemical, salt-based chemical, agrochemical, and pharmaceutical industries), metallurgical industries, cogeneration industries, and civil public facilities (including airports, four- or five-star hotels, hospitals, large office buildings, and commercial complexes). The energy conservation and emission reduction is a basic national policy in China. Large energy consumption companies will continue to face the pressure in the field of energy conservation and emission reduction. Recommendations for these users include as follows:

The first is that senior company managers should pay great attention to the application of efficient and new energy conservation technology for CWSs. In spite of the great energy consumption of CWSs, energy conservation issues have been paid little attention, and energy conservation works are promoted slowly.

The second is for the top management of companies to pay attention to the application of new energy conservation technology, actively promote efficient technologies, and prevent the existing interest chain from impeding the application of new and efficient technologies.

The third is to utilize efficient and new technologies in batch and form a scale demand. Large companies may count CWSs to be transformed, package them into the batch improvement plan, negotiate with the technology provider to reduce the overall transaction cost, and achieve the overall promotion of energy efficiency.

The fourth is to select the cooperation mode of contract energy management. For end users, the mode of contract energy management has characteristics such as less risks, lower costs and greater gains.

The fifth is to make full use of the current national policies on supporting energy conservation and emission reduction in China, and obtain the energy conservation subsidies and the benefit of carbon emission transaction while reducing the operating cost and improving the overall company efficiency through the technical improvement for energy conservation.