

Second Batch of Domestic TOP TENs List

China Industrial BP List

BP1: Energy Management System Construction Case

China National Heavy-Duty Truck Group Corp.,Ltd. (hereinafter referred to as: SINOTRUK) has planned and established an energy management system according to the characteristics of the enterprise. The energy management center covers the main production units and more than 75% of the major energy consumption units. It has achieved fruitful results in the coordinated promotion of energy conservation in management,process,and technical transformations,and has won many honors at the international,national,provincial,and ministerial levels,leads the important role of value and demonstration.

In terms of energy conservation in process,new

materials,new equipment,new process and new technology are adopted to reduce energy consumption. Through continuous verification and optimization of process parameters,SINOTRUK has effectively reduced energy consumption. In terms of energy conservation in management,each production unit has implemented continuous production,partial continuous production,increased economic batch size,centralized production scheduling,accelerated production cycle,standardized on-site operation and many other energy conservation ideas in management,SINOTRUK has explored energy-saving potential,innovated energy conservation management,achieved significant



performance. In addition, SINOTRUK has also carried out electricity DSM, through rational allocation of resources and effective control on-peak load to save basic power cost, has increased the utilization rate of off-peak electricity, reduced the unit price of electricity to realize power conservation, rational use, plan use, and smart use of power, has gained economic benefits of more than 30 million RMB annually. In terms of energy conservation in technical transformation, SINOTRUK has implemented air compressor waste heat utilization, chilled-water

thermal storage, and ground source heat pumps etc. large-scale technological transformation, gained significant benefits.

Through the establishment and operation of the energy management system, SINOTRUK has established a long-term mechanism, significantly improved the awareness of energy conservation. The annual reduction in comprehensive energy consumption of vehicle set has exceeded 5%, which has strongly promoted the sustainable development of the company. ■

BP2: Energy-saving Practical Case Through Centralized Management and Control by Yanggu Xiangguang Copper

Yanggu Xiangguang Copper Co.,Ltd. (hereinafter referred to as: Yanggu Xiangguang Copper) according to its enterprise characteristics: To achieve systemization of energy management with the establishment and operation of the energy management system as the core. to achieve flat energy management with the construction of an energy management and control center as the tool. to train energy management masters as a starting point to develop a high-quality energy management team. This project has laid a solid foundation for energy conservation,improved the level of energy management,and achieved a good demonstration effect on the construction of a centralized energy management and control system in the non-ferrous metal industry.

Yanggu Xiangguang Copper has organically integrated the construction of hardware facilities and the corresponding energy management system,realized synchronous planning and synchronous

construction,which makes the sufficient combination of energy management system and the energy control center. Thus,has established a modern energy management mode,integrates online process monitoring,energy scheduling,and energy management as a whole,has realized centralized and flat energy management based on real and accurate energy measurement data. The enterprise has set up energy management positions,recruited energy management leaders,and carried out training on laws,regulations and professional knowledge for energy management leaders and related personnel,has improved their awareness of energy conservation and environmental protection.

Benefiting from systematic energy management,Yanggu Xiangguang Copper has achieved a reduction of 112.69 Kgce/t of cathode copper energy consumption per ton of product,energy saving rate of 6.1%,unit energy



saving cost of 3,200 RMB per ton of standard coal, realized annual energy saving of 25,900 tce.. Through the promotion of energy management mode, in 2018, the output of copper cathode has achieved 1.35 million tons, the annual energy saving

of 256,500 tce., equivalent to annual CO₂ emission reduction 400,000 tons. In 2019, the output of copper cathode was 2.15 million tons and the annual energy saving of 408,500 tce., equivalent to annual CO₂ emission reduction 640,000 tons. ■

BP3: Shagang Group 2500kW Dust Exhausting Fan Energy-saving Reconstruction Project

The power saving rate of the winding type permanent magnet coupling governor system is obviously better than that of the traditional hydraulic coupling, variable frequency and eddy current permanent magnet governor technology, which is at the international leading level among similar products, has provided a brand-new technical option for power saving of motor governor, which can be widely used to improve energy saving and transmission efficiency of motor in various industries, can significantly improve the efficiency of motor system, has a relatively broad market prospect.

In Jiangsu Shagang Group, EAF Steel Plant has adopted winding type permanent magnet coupling governor technology to perform the technical transformation for the 2500kW secondary dust removal fan in No.2 workshop. Aims to the actual situations of the original fans, such as large vibration, oil leakage, many mechanical troubles, long response time of speed control, low accuracy, and small range of speed control etc., formulated a corresponding technical schemes and energy-saving evaluation for the transformation. When implementing the onsite transformation, the hydraulic coupling was directly

replaced at the original place, without adding space and foundation rework, without adding cooling facilities such as oil cooling or water cooling. After replacing the original variable speed hydraulic coupling with the winding type permanent magnet coupling governor, the system has no hydraulic oil loss issue, high reliability, can isolate vibration and noise effectively, reduces impact load damage of all equipment in the entire transmission chain, and low maintenance cost.

In this practical case, according to the on-site measurement by Jiangsu Shagang Group, under the working condition of 645 rpm/min. of the dust removal fan, the power saving rate is 41%, annual power saving of the project is 4.305 million kWh. ■



BP4: Energy-saving Transformation of Permanent Magnet Eddy Current Flexible Transmission Energy-saving Device for Dust Removal Fan

Dust removal fan is a major power consumer among all the auxiliary facilities in steel plants, which directly affects the economic benefits of steel companies. This practice case uses permanent magnet eddy current flexible transmission energy-saving device to replace hydraulic coupler, carries out energy-saving transformation to the blast furnace primary dust removal fan, which further taps the energy-saving potential and fills the gap in the application of high-power permanent magnet transmission technology at home and abroad.

Jiangxi Xinyu Iron and Steel Co., Ltd. has upgraded the primary dust removal fan of the blast furnace that used hydraulic coupling originally for energy-saving speed regulation. The minimum speed of the fan has been reduced from 600rpm to 300rpm, the power saving rate has been increased by 45% more based on the energy

saving of the hydraulic coupler, and the safety of the equipment has also been improved effectively.

This project is the first application of permanent magnet eddy current flexible transmission energy-saving device in high-power equipment (3500kW). According to measurement and calculation, the energy saving rate of this project in 2018 and 2019 reaches 31.3% in average. ■



BP5: Application of Energy-saving Optimization Technology in Compressed Air System

There are only 60% of the energy consumption is valid utilized for production, and the remain 40% of the energy is consumed loss when the compressed air is used in industry. Through air compressor system energy-saving optimization technology, including air compressor energy-saving, air-compression pipe network energy-saving management and control system, dedicated terminal energy-saving management and control system, etc., improves the utilization efficiency of air compressors, increases power efficiency, and improves the automation management level of enterprise. The energy-saving benefits produced by this technology are far greater than the benefits of general energy-saving equipment, which has huge social and economic benefits.

Beijing Aisuo Energy Technology Co., Ltd. has carried out innovative work from energy-consuming equipment to energy-saving calculation and diagnosis of the entire system of energy-

consuming air compressors, and invented and developed corresponding devices. Through efficient, intelligent, regulated and standardized configuration design, optimizing the station layout, replacing inefficient equipment, stabilizing output pressure, improving purification quality, promoting green and low-carbon concept, reducing operating costs, to realize a new type of air compressor station for intelligent energy consuming. The construction of the air compressor station adopts BOO operation mode, the investment, construction, operation and maintenance of the air compressor station are all undertaken by the company.

The application of energy-saving optimization technology in compressed air system provides an overall energy-saving solution for compressed air system from the power source to the terminal gas using equipment. The energy-saving rate can

BP6: A Case of Energy Management System Construction in Beijing Capital Airport

Beijing Capital International Airport Co.,Ltd. (hereinafter referred to as the Capital Airport),as the 'First Country Gate',is also a key energy-consuming unit in Beijing. Capital Airport follows the systematic management of 'Plan-Do-Check-Act/Improvement',strives to implement every important section of energy management into practice,continuously reducing energy consumption and improving energy efficiency. Capital Airport is the first domestic enterprise in the airport industry that owns the energy management system certification,whose management concept provides a demonstration to improve energy efficiency in the airport industry.

The Capital Airport regards the construction of the energy management system as the foundation and core of energy conservation,strictly implements energy conservation operations,continuously optimizes the

operation scheme,has provided effective refined management tools to achieve energy conservation targets,and effectively improves energy efficiency. According to the characteristics of the aviation industry,relying on the energy management system,implements refined management of the terminal lighting system,formulates the special operation plan for the baggage system,control the operation modes according to different seasons and environmental conditions,adjusts the air conditioning operation mode,has realized continuous energy consumption reduction. Uses market-oriented energy conservation mechanisms and business models,gives full play to the expertise of professional institutions,adopts contract energy management mechanisms,builds photovoltaic power generation,carries out clean energy utilization,promotes bridge-mounted power supplies



and other measures to significantly reduce energy consumption. Capital Airport splits the overall targets of energy consumption and emission reduction to each department, links to departmental KPIs, and set

up awards named 'Double increase and Double reduce' to commend departments and individuals who have performed outstanding energy conservation and made important contributions. ■

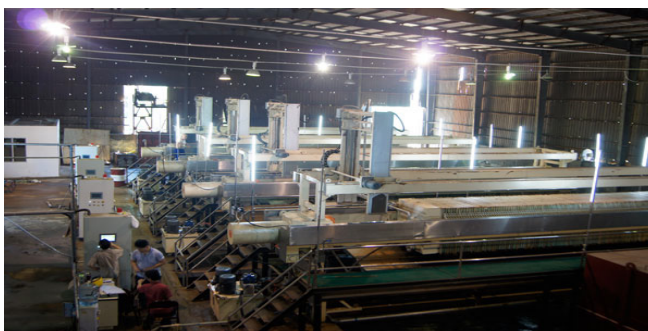
BP7: Energy-saving Transformation of Textiles Wastewater Treatment and Recovery of Waste Heat from Waste Gas of Setting Machines

Hutai (Panyu) Textile Printing and Dyeing Co.,Ltd. (hereinafter referred to as Hutai Textile) attaches great importance to technological innovation and energy conservation & environmental protection,vigorously promotes clean production in the enterprise. Through implementing energy-saving transformation in the treatment process of wastewater of printing and dyeing and waste gas of setting machines,it has effectively realized refined operation and intensive management,provides a good demonstration case for energy conservation and environmental protection in the textile printing and dyeing industry.

Hutai Textile monitors textile waste water and waste gas treatment in real time,realizes on line collection,transmission and analysis of the key parameters of waste water's physical and chemical treatment,biochemical treatment,deep level treatment and waste gas pretreatment,etc.,adopts corresponding measures through automatic dosing,precise aeration,automation transformation and waste gas heat

recovery from the setting machine,improves the stability of equipment operation,optimizes the operation of the overall system,improves efficiency, reduces operation costs,and has achieved the targets that combining energy conservation and environmental protection.

This practical case enables Pacific Textiles to realize power saving 525,600 kWh,chemical dosage cost saving 9.75 million RMB,and 384,000 RMB in labor costs. The total annual energy saving reaches 10,800 tons of standard coal,the comprehensive energy consumption per unit product is 973.8kgce/t and 1097.5kgce/t in 2018 and 2019 respectively,keeps the advanced level in the industry. ■



BP8: Shengli Oilfield Branch Dong Sanlian Regional Integration Energy Efficiency Improvement Project

In response to the national energy conservation and emission reduction policy, Shengli Oilfield Branch has implemented Sinopec's 'Energy Efficiency Doubling' plan. In Dong Sanlian region of Gudong Oil Production Plant, in accordance with the integrated energy efficiency improvement concept of 'underground priority, wellbore optimization, and onground support', has analyzed oil reservoirs, Process, gathering and transportation, water injection and other oilfield development nodes, defined the factors that affect the energy using of the system, innovated and integrated 15 energy-saving technologies, realized the balance of oil reservoir fluid production, improved the system efficiency, and reduced the energy consumption.

In terms of oil reservoirs, through the comprehensive application of numerical simulation analysis and research technology, well pattern adjustment turning to streamline technique, injection-production parameter

optimization technique, etc., the fluid volume was reduced by $2,500 \text{ m}^3/\text{day}$, and the combined station processing fluid volume was reduced by $2,500 \text{ m}^3/\text{day}$, reduce the water injection volume by $2,300 \text{ m}^3/\text{day}$. In terms of technology, through the technical application of integrated power reduction, high-percolation sand control, oil well real-time monitoring and auto-diagnosis, large-displacement tubular pump lifting, energy-saving motors and other techniques, reduces the motor capacity by 793 kW, single well daily power saving is 26.7 kWh in average. In terms of water injection, through implementing step pump combination, pipeline descaling, and eccentric side adjustment integration etc. techniques, optimizes production-fluid water injection structure, the water injection volume is reduced by $2,300 \text{ m}^3/\text{day}$, the unit consumption of water injection is reduced by 0.07 kWh/ton, Pipeline descaling pressure loss



is reduced by 0.84 MPa in average. In terms of gathering and transportation, through the applications of electromagnetic coalescence water separation, back pressure reduction, automatic oil-water contact control, and fzq etc., the back pressure of oil wells is reduced by 0.2 MPa, the heating load is reduced by 2030 kW.

As of the end of 2019, in the project implementation

area, the comprehensive water cut has dropped by 0.3%, the cumulative oil increase is 62,000 tons, the cumulative power saving is 17.6153 million kWh, the fuel oil and gas saving equivalent to 2525.29 tons of standard coal, the cumulative energy saving is 4790.46 tons of standard coal, gains energy saving benefit of 14.9308 million RMB. ■

BP9: Low Temperature Waste Heat Power Generation Technology

Case for 2# S-zorb Unit in Yanshan Refinery

SINOPEC Yanshan Petrochemical Company's newly-built S-Zorb device waste heat comprehensive utilization system is the first set of devices established by Sinopec Corporation to recover low-temperature heat of gasoline products and connect to the grid for power generation. The designed capacity of the waste heat comprehensive utilization system is 650KW, the designed annual operating time is 8,400 hours.

In the S-Zorb device, the gasoline temperature at the bottom of the tower is relatively high, about 130°C~150°C, while the required temperature of the gasoline that exits the device into the storage tank is about 50°C. If adopts air cooling and water cooling, this part of the low temperature heat is not effectively utilized. In this energy-saving transformation, the bottom oil out from the stabilization tower directly enters the evaporator of

the organic Rankine cycle (ORC) system, transfers the heat to the circulating working fluid (R245fa) in the ORC system, and then connect to the air cooling device after the temperature of bottom gasoline is reduced to 70°C. The working fluid (R245fa) steam from the evaporator enters the screw expander to perform work and drives the generator to generate power. The exhausted steam of the working fluid (R245fa) after working enters the condenser, which is cooled and condensed by the air cooler. The condensed R245fa circulates again in the system after boosting by the working fluid pump. According to project measurements, the output power of the unit is about 677kW, the net power generation of the unit is about 535kW, which can meet about 50% of the total power load of the device.

By this practice case, it has annual saving 1.68

million tons of standard coal, the energy consumption of the device is reduced by about 5%, and the project return period is 5 years. In 2018 and 2019, the annual generating capacity of the unit is 5,252,735kW and 5,602,917kW, equivalent to 625kW and 667kW per hour that matches the design targets. This practice case can be promoted to other domestic S-Zorb devices, and the waste heat utilization technology that adopted in this practice can be further promoted and applied to reforming units and diesel hydrogenation units that have the similar low-temperature waste heat resources in the petrochemical industry. ■



BP10: Large Temperature Difference Cogeneration Heating Technology

Shanxi Datang International Yungang Thermal Power Co.,Ltd. relies on the urban central heating project of Datong City,utilizes absorption heat pump technology to form a large temperature difference in the primary pipe network,recovers the waste heat of the turbine exhaust steam at the heat source end,which serves the urban central heating,solves the serious problem of heat sources shortage, reduces the total energy consumption of cogeneration. This practice has explored an effective way to solve the contradiction problem that the urban central heating main network cannot meet the needs of urban development,has a good significance for promotion and prospect for application.

There are multiple heat sources and urban heating networks in Datong City,according to this actual situation,the hydraulic conditions model of the pipe network has been established for the first time,has defined the layout plan of the absorption heat pump for the heating station of the secondary network,and

the return water temperature of the heating network in the heating area is decreased from 65°C to 39°C,the temperature difference between the supply and return water of the primary network is increased from 55°C to 76°C,the heat transfer capacity of the pipe network is increased by 38%. In the first station of heating network,a series-parallel combination mode is adopted in the heating system process. Through the three-stage,series connected pre-heat exchanger - parallel connected absorption heat pump - the peak heater,heating the circulating water in the network,which makes the energy grades more matched between the return water of low temperature heating network and the waste heat of low temperature exhaust steam. So that,the two units of the same model form different high and low operating back pressures,which reduces the average operating back pressure of the two units, reduces the disadvantaged effects in the initial and end cold periods on the power generation,improves



the energy efficiency of the system and the safety of the air cooling island, reduces the irreversible loss of heat transferring.

Through the implementation of the project, there are 9 million m² heating area added. In 2018, the heat supplying has increased by 5,415,900 GJ, and energy

saving by 222,200 tons of standard coal compared with which before the project implementation. In 2019, the heat supplying has increased by 6,879,600 GJ and the energy saving by 227,400 tons of standard coal compared with which before the project implementation. ■