

# Summary of Liberty Energy Evaluation Report

**Jiangsu Co., Ltd.** is an enterprise dominated by export and the leader of clothing production and commerce in China clothing market. Its exports reach to \$180 million per year, which top ranked the clothing export industry. Liberty has a high reputation in China and also has the unique competitive advantage in clothing production field.

This enterprise is the first textile and garment enterprise in China which complete the certification audit of Energy Management System (GB/T23331) and Verification of Greenhouse Gases (ISO14064). Also Liberty passed the certification audit of ISO9001, ISO14001, SA8000 / WRAP Social Responsibility, GB/T28001 Occupational Health and Safety.

In recent years, the company adhere to the sustainable development planning and implemented many kinds of energy-saving measures including rain water collection and utilization system, wastewater treatment system and water reuse, built the green building, distributed solar photovoltaic roof, the air conditioner of ground source heat pump, intelligent production automation, air cooled heat pumps, waste heat recovery device, frequency conversion generator and sewing equipment, use LED lamps and lanterns. Some measures conform to the state/local industrial policies for energy saving have got the national or local relevant subsidies.

The detail of the energy-saving projects are described below:

## **1. Rain water collection and Utilization system**

The project is put into use in 2011 and the upfront investment is 0.6 million RMB, 90 thousand tons rainwater can be collected and used for the operative section of Liberty. The project can save water cost of 0.288 million RMB annually, besides that the annual O&M cost of this project (based on 2014 data) is 0.045 million RMB. Based on the economic calculation, the internal return rate (IRR) of this project is 39% and project investment payback period is 2 years. The project has significant benefit. Till now, there is no state or local government subsidies for this project.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** Taking into account the industrial water price, especially the water price of dyeing process is 4.7 RMB per ton, the operation water cost of 4.7 RMB per ton is higher than the rain water purification treatment cost (0.50 RMB per ton), the project can effectively reduce the water resources cost of the enterprise. **2.** The amount of rainfall in Jintan city is plenty, enterprise park can be replanning for rainwater collection. **3.** Upfront investment of this project is not high, the operation and maintenance cost of the equipment is low and the life-year of the equipments can be up to 20 years.

## **2. Wastewater treatment system and water reuse**

The project is put into use in July 2010 and the upfront investment is 12 million RMB, 420 thousand tons recycled water can be reused for the operative section of Liberty. The project can save water cost 1.974 million RMB annually, besides that the annual O&M cost of this project

(based on 2014 data) is 2.9064 million RMB. The internal return rate of this project is minus and Liberty can not recover the investment cost because of the high O&M cost. Till now, 0.6 million RMB subsidies from local government has been offered to the Liberty.

Two main reasons can be concluded for the Liberty to make the investment decision: **1.** The water price of dyeing process is 4.7 RMB per ton, and the recycle water treatment cost is 6.92 RMB per ton, though the investment can not be recovered, the leadership considering the factors such as water resources can be recycled and insist on project investment. **2.** The decision give full consideration to the requirements of environmental protection, which can effectively control the water pollution from the source and reduce the emissions of waste water efficiently.

### **3. Distributed solar photovoltaic roof**

The project is put into use in 4 phases, all the constructions were finished in December 2012, and the upfront investment is 15.08 million RMB, 1,500MWh electricity can be generated annually . The project can save electricity cost 1.5 million RMB annually, besides that the annual O&M cost of this project (based on 2014 data) is 0.005 million RMB. The internal return rate of this project is 7.64% (not include the subsidy) based on the economic calculation, project investment payback period is 10 years, which has significant benefit. Till now, 19.63 million RMB subsidies from the China government and local government has been offered to the Liberty, even higher than the project total investment.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** Development of solar energy resources, which has become the one of the world strategic plan to solve energy constraints. **2.** Leadership practice low carbon reduction commitment with the practical action. Leadership consider to promote their own social image, their international competitiveness and publicity to foreign purchaser, insist on investing this project. It can be seen that the green concept of Leader play a vital role. **3.** Based on the Feasibility Study report of this project, the annual operation hour in Jintan city is 1875 hours which is higher than the average data of China, So the projects have unique natural advantage.

### **4. Green Building**

The project is put into use in September 2011, and the upfront investment is 60 million RMB. Prior to the integration of design, the composition of the green building is the combination of a variety of energy saving technology. Besides that the annual O&M cost of this project (based on 2014 data) is 0.1 million RMB. The green building has got the Standard assessment of LEED, till now, there is no state or local government subsidies for this project. China industrial green building standards are not available at the moment, so the subsidies on industrial green building cannot apply for temporary.

Three reasons can be concluded for the Liberty to make the investment decision: **1.** In order to improve the staff's working environment. **2.** Leadership practice low carbon reduction commitment with the practical action. Leadership consider to promote their own social image, their international competitiveness and publicity to foreign purchaser, insist on investing this project. It can be seen that the green concept of Leader play a vital role. **3.** The life-year of green building is longer than the ordinary one and this building is more efficient in energy field.

### **5. Air conditioner of ground source heat pump**

The project is put into use in September 2011, and the upfront investment is 2.1 million RMB, 46,900KWh electricity can be saved annually. The project can save electricity cost 0.0572 million RMB annually, besides that the annual O&M cost of this project (based on 2014 data) is 0.04 million RMB. Based on the economic calculation, the internal return rate of this project is lower than 8% (benchmark) because of the high O&M cost. Project investment payback period is longer than 20 years, which means the project has faced serious economic barrier. Till now, there is no state or local government subsidies for this project.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** In order to improve the staff's working environment, The body feeling of cooling and heating will be comfortable no matter where the worker's location. **2.** According to the scheme of the green building planning, enterprise will use ground source heat pump technology in the integration of green building leadership insist on investing the project. It can be seen that the green concept of Leadership play a crucial role. **3.** The leadership wants to make an effective attempt.

## **6. Air cooled heat pumps**

The project is put into use in October 2014, and the upfront investment is 3.5 million RMB. Due to the project was put into use recently, there is no more related operation data such as the amount of electricity saved, O&M cost and so on. Till now, there is no state or local government subsidies for this project.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** Cooling and heating speed is faster than ordinary air conditioner, 15 to 20 minutes can reach the set temperature. **2.** The temperature difference of supply air is small and air volume is big, furthermore indoor temperature distribution is uniform, temperature fluctuation is small, no air conditioning dead angle. **3.** Compare to the ordinary air conditioner, more than 15% electricity can be saved.

## **7. Intelligent production automation**

The project started since 2008 and last 8 years to complete the improvement. The total investment is 100 million RMB, rate of remade and rate of rejects reduced from 0.4% to 0.27% and the staff work time of 2014 can also reduce 3.8% compares to other years. The project can enhance the production rate up to more than 30% and can save the energy cost of 5.32 million RMB. Based on the economic calculation, the internal return rate of this project is 3.38% which is lower than 8%--benchmark. Project investment payback period is 18.8 years, which means the project has faced serious economic barrier. Till now, 0.7 million RMB subsidies from local government has been offered to the Liberty.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** The inherent requirement for the transformation and upgrading of the production line. **2.** According to the intelligent project feasibility study report, the project can save water, electricity, steam/gas cost and artificial cost, it can up to 3.191 million RMB per year; Energy consumption cost of clothing production can reduce 23.11%, which including saving energy costs, labor cost, it can up to 2.1293 million RMB per year. **3.** For the future research, development of new products and technological change are of a great help.

## **8. Frequency conversion generator and sewing equipment**

The project is put into use in September 2014, and the upfront investment is 7.78 million RMB, 16,000MWh electricity can be saved annually . The project can save electricity cost 1.6 million RMB annually, besides that the annual O&M cost of this project (based on 2014 data) is 0.08 million RMB. Based on the economic calculation, the internal return rate of this project is 20.99% which is much higher than 8%--benchmark. Project investment payback period is 5.1 years, which means the project has significant benefit. Till now, there is no state or local government subsidies for this project.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** In order to save the electricity consumption, PP can use and selection of frequency conversion generator combining with the characteristics of enterprise. **2.** The replacement of old generator policy published by China government, PP has to meet the policy. **3.** PP considers the requirements of low carbon emissions.

### **9. Improved the transformer for saving energy**

The project is put into use in October 2013, and the upfront investment is 0.21 million RMB. Due to the difficulty of monitoring and measuring , there is no more related data such as the amount of electricity saved. But it can be sure that the high load factor of transformer can save the electricity. Till now, there is no state or local government subsidies for this project.

Two main reasons can be concluded for the Liberty to make the investment decision: **1.** The original transformer is old and its load factor is low, the amount of electricity wasted annually is huge. **2.** The requirement for saving electricity is urgent.

### **10. LED energy-saving bulb**

The project is put into use since 2012, and the upfront investment is 0.9 million RMB, 6,000MWh electricity can be saved annually . The project can save electricity cost 0.6 million RMB annually. Based on the economic calculation, the internal return rate of this project is 66%. Project investment payback period is 1.5 years, which means the project has significant benefit. Till now, there is no state or local government subsidies for this project. Till now, there is no state or local government subsidies for this project.

Two main reasons can be concluded for the Liberty to make the investment decision: **1.** The life-year of original bulb is short and its power consumption is high. **2.** The requirement for saving electricity is urgent.

### **11. Waste heat Recovery Device**

The project is put into use in July 2012, and the upfront investment is 0.518 million RMB, 30 ton steam can be saved per day. The annual working hour of device is 66 days and the price of steam is 200 RMB per ton. The project can save steam cost 0.37 million RMB annually, besides that the annual O&M cost of this project (based on 2014 data) is 0.025 million RMB. Based on the economic calculation, the internal return rate of this project is 71.9% which is much higher than 8%--benchmark. Project investment payback period is 1.5 years, which means the project has significant benefit. Till now, there is no state or local government subsidies for this project.

Three main reasons can be concluded for the Liberty to make the investment decision: **1.** The amount of waste heat is large, it must be used to be avoid of waste . **2.** The economic indicator of the project is superior. **3.** The steam price is high and PP has to cut the operation cost

by investing this project.

**The summary of the Energy-saving works done by Liberty is listed below:**

Item	character	popularizing prospect <sup>1</sup>	Note
1. Rain water collection and utilization system	Upfront investment little and short payback period, long operating period of the equipment	1. Recommend to use	Need regular maintenance and check whether the rain collection device needs to be improved
2. Wastewater treatment system and water reuse	Upfront investment large and long payback period, the equipment operating cost is high	2. Recommend to pay close attention	When operating cost descend, this technology can be adopted properly
3. Renewable energy source: Distributed solar photovoltaic roof	Upfront investment large but equipment price is decline in recent years, the equipment operating cost is low and has significant economic benefit	1.Recommend to use	Distributed solar photovoltaic is widely used and the investment is decline, have favorable maneuverability
4. Green building	Upfront investment Large and long payback period, long operating period of the equipment, this technology requires the integration of design at the early stage and strictly carry out the design requirements for construction	3.Pay properly attention	There is no industry green building policy subsidies published
5. Air conditioner of ground source heat pump	Upfront investment Large and low operating cost, obviously power saving effect and no pollution to the environment	1.Recommend to use	The factory which has large consumption for summer cooling and winter heating should consider to use this technology
6. Air cooled heat pumps	Upfront investment Large and low operating cost, obviously power saving effect and no pollution to the environment	2. Recommend to pay close attention	The factory which has large consumption for summer cooling and winter heating should consider to use this technology
7. Intelligent production automation	Upfront investment Large and upgrading last long time, Production efficiency obviously increased, rework rate decreased obviously, saving raw materials and energy consumption	3.Pay properly attention	Demand for production line upgrade, enterprise can adopt this technology appropriately

8. Frequency conversion generator and sewing equipment	Upfront investment Large and Production efficiency obviously increased, working hours of the employee is shortened, Power consumption is dramatic decline and has significant economic benefit	1.Recommend to use	Enterprises has large number of equipments can consider to carry on the equipment replacement gradually, may combined with the Energy management Contract to conduct the equipment replacement
9. Improved the transformer for saving energy	Upfront investment little and obviously increased the power factor in order to save the power	1.Recommend to use	Old transformer need to be eliminated, the enterprises consumed large amount of power can take this technology.
10. LED energy-saving bulb	Upfront investment little and short payback period, has significant economic benefit	1.Recommend to use	LED has low price and long operating life, enterprises can use this technology combined with Energy Management Contract
11. Energy Saving Water Dispensers	Upfront investment little and short payback period, has significant economic benefit	1.Recommend to use	Suitable for the people gathering area
12. Waste heat Recovery Device	Upfront investment moderate and short payback period, has significant economic benefit	1.Recommend to use	This technology is mature and widely used

Note 1: Popularizing prospect is given based on the National reward or subsidies, as well as the project proceeds, O&M cost and enterprise actual operation experience. Popularizing prospect can be divided into 3 levels: **1. Recommend to use 2. Recommend to pay close attention 3. Pay properly attention.**

As the energy saving measures gradually put into use, the unit carbon emissions of clothing products of Liberty has dropped from 0.1142 kgce in 2011 to 0.09784 in 2014 kgce, considering annual cloth production of 20 million pieces, the energy-saving measures can reduce 327.2 tce per year. The unit carbon emissions of printing and dyeing products of Liberty has dropped from 8.30 kgce in 2011 to 1.96 kgce in 2014, considering annual production of 2000 tons, the energy-saving measures can reduce 12680 tce per year. The energy-saving measures have obvious economic benefits and social benefits.

Enterprise's energy saving and emissions reduction work has done meticulous, but according to the instruction made by Ms. Han Yaping ( energy management personnel) that Liberty still have the space of energy saving and emissions reduction. In the near future, Liberty wants to complete another 3 energy saving works which are comprehensive office building energy-saving renovation(ongoing project), continue to replace the old sewing facilities (ongoing project) and

remold of boiling furnace located in the living quarters for saving steam(will start from 2016).

Referring to foreign practices for apparel factories to save energy, there are lots of energy saving methods can be used. National Resources Defense Council(NDRC) reviewed more than a dozen textile mills and studied five in-depth to identify simple, cost-saving opportunities to reduce water, energy, and chemical use—via improvements in manufacturing efficiency. This initiative does not call for large-scale retooling of the textile industry. To the contrary, the opportunities summarized here as follow are all easy-to-implement and low-cost opportunities that pay for themselves in eight months or less. The method include install meters to measure savings, five water saving practices, five energy saving practices and electricity saving practice.

Furthermore in two and half years, Sustainable Energy Saving for the European Clothing Industries (SESEC) has worked closely together with some 50 European clothing companies to pursue energy efficiency through energy audits, benchmarking, self-assessment, and training. Data collected from the participating countries all show positive results. For example, according to the information provided by four Italian clothing companies, the measures implemented or expected achieve cumulative savings of up to 7.650.000 KWht/year, largely thanks to expected or implemented installation of cogeneration, installation of heat exchanger for recovering waste heat, installation of heat exchanger for recovering waste heat from smoke, recovery of process heat. Data allowed to calculate the expected reduction summing up at between 16% and 23% of a given company total thermal energy consumption and between 1% and 12.5 % of the total electrical consumption.

In Portugese, the impact of SESEC was more thoroughly analyzed in four companies with key results of direct investments of a total of approximately € 480.000 in the considered time frame which resulted in a reduction of energy consumption achieved in one year of 259.000 KWh. The energy efficiency measures considered, started or already completed included: replacement of fluorescent lighting with LED tubes, installation of photovoltaic panels, installation of solar water panels (preheat boiler water), insulation of steam valves and fittings, insulation of condensate deposit, installation of Variable speed drive on automated cutting machine, reduce leaks in air compressor network. Apart from the methods mentioned above, SESEC has also proposed many other energy-saving methods, including the installation of high-efficiency motors and LED lighting, the installation of inverter on motors with variable regimens, the application of cold storage system and power factor correction, the replacement of flat belts with V belts, etc.

**From the energy-saving work experience of Liberty, the idea of decision-makers of the enterprise is the key to lead the enterprise walking towards to the circular economy road. No guidance and support from the leadship, the implementation of the circular economy will be an empty words. In the actual operation of the circular economy, high investment and less economic returns or even zero return is common phenomenon and the environmental and low carbon benefit is remarkable. So correctly handle the economic investment, economic benefits, environmental benefits, low carbon effect, etc., which needs pioneers equipped with superior knowledge, advanced consciousness, valuable practical action, to support the circular economic work.**