

# Study on the Situation and Countermeasures of Power Supply& Demand in Sichuan Province under the Background of the Supply-Side Reform

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**Abstract.** Actively promoting supply-side reform is a major innovation for the country to initiatively adapt to and lead the new normal of economic development. It is the "13th Five-Year Plan" economic development action guide of China. First, the article briefly introduces the background and connotation of the supply-side structural reform, and concisely analyze the relationship between structural reform and power development. Secondly, it reviews the great achievements in Sichuan power development based on since the 12th Five-Year Plan. Finally, it analyzes the problems existing in Sichuan power development under the supply-side reform, and put forward the purposed solutions.

**Keywords:** supply-side reform; "13th Five-Year Plan"; structural reform and power development; 12th Five-Year Plan.

## 1. Introduction

Under the new normal, the energy industry in the basic position of the national economy is also facing prominent problems, such as traditional overcapacity, bottlenecks in the development of renewable energy and inefficient operation of the energy system. It needs innovative energy systems and mechanisms to vigorously promote structural reforms in the energy supply side. Strongly promote the industrial transformation and development shift. Specific to the power industry, based on firmly establishing the five development concepts "innovation, coordination, green, openness, sharing", closely integrate the industry development status, promoting the supply-side structural reforms. To resolve the staged excess capacity of the power installed, suspending the new thermal power project, developing clean energy in an orderly manner, and focus on solving the problem of surplus water, abandoned wind, and abandoned light. Improving the ability of the power grid to allocate resources, further enhance the service capacity and level of public goods, and promote the sustainable and healthy development of the power industry.

## 2. Sichuan Electric Power Supply and Demand Status

### 2.1 Power Supply Development Status

#### 2.1.1 Analysis of Power Supply Installation Structure

Sichuan power supply installed has been rising rapidly, as of the end of 2017, Sichuan power generation installed capacity of 97.21 GW, which was 2.25 times that of 2010. Many hydropower stations were built, such as Xiangjiaba, Xiluodu, Jinping, Guandi, and several medium and small hydropower plants, with installed capacity of 77.14 GW, an increase of 151%, accounting for 79.4%. Thermal power has built in Xinping, Rongzhou, YunTan CFB and other supercritical unit coal-fired units and Dazhou gas turbines, installed capacity of 16.62 GW, an increase of 32.6%, accounting for 17.1%. Moreover, with the development of new energy sources in Panxi area, wind power and photovoltaics spreaded rapidly in sichuan, installed capacity of 2.1 GW and 1.35 GW respectively, accounting for 2.2%, 1.4%. The power supply structure continued to be optimized, and the proportion of green increased. The installed capacity of non-fossil energy power generation reached 80.61 GW, ranking first in the country, accounting for 82.9% of the total installed capacity, an increase of 11.9 percentage points over 2010.

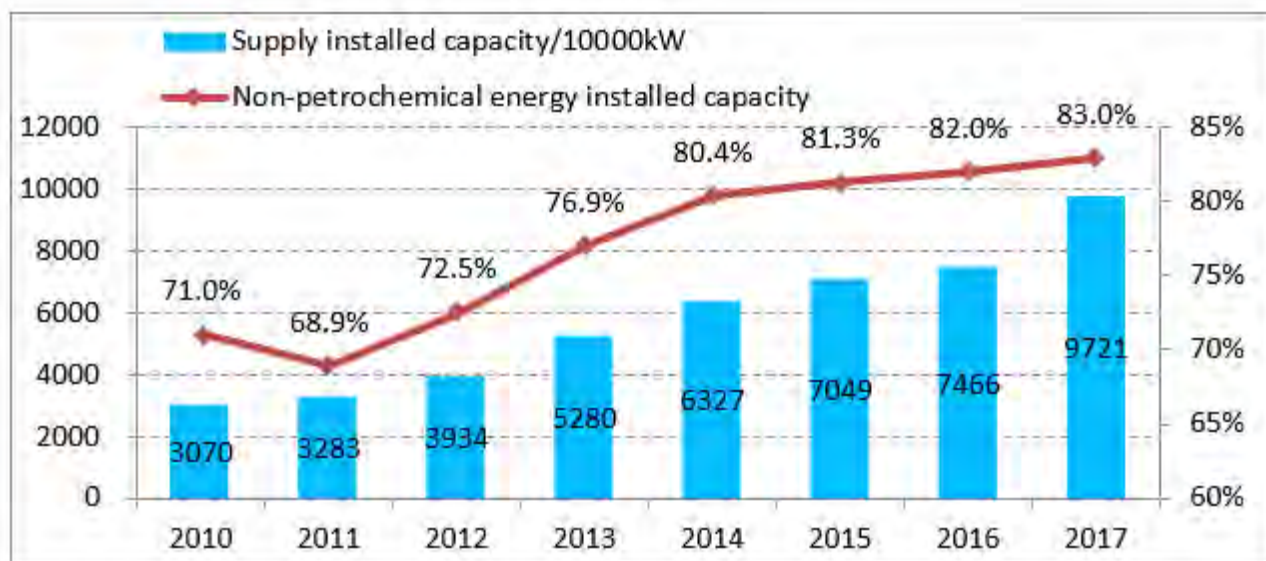


Figure 1. Sichuan non-fossil energy installed capacity and proportion

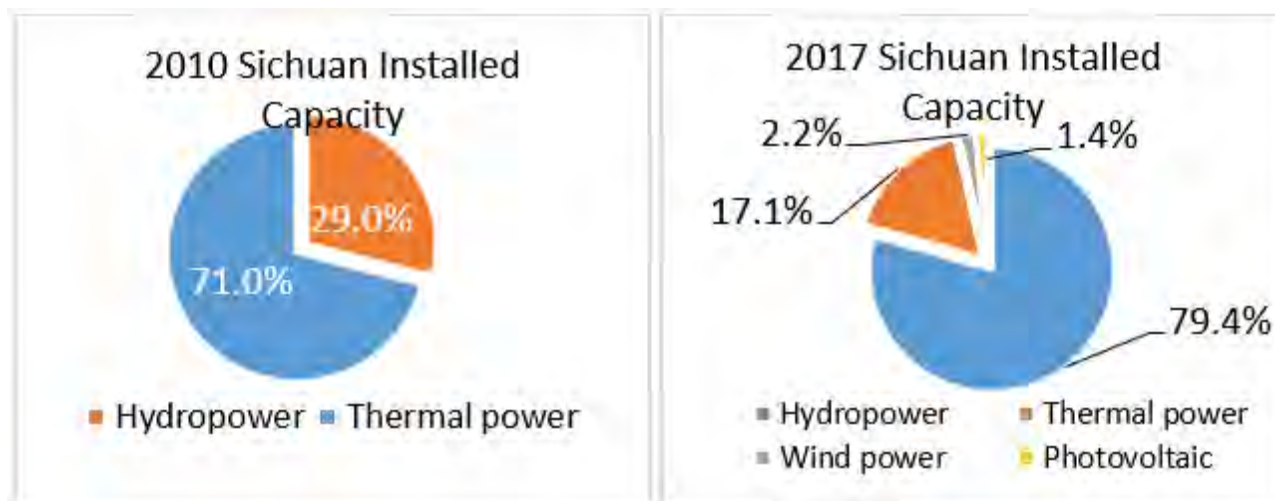


Figure 2. Comparison of installed structures in Sichuan in 2010 and 2017

### 2.1.2 Analysis of Power Generation Capacity Structure

In 2017, the full-caliber power generation was 356.9 TWh, which was 2.09 times that of 2010. Among them, hydropower was 133.4 TWh, an average annual increase of 15.7%, accounting for 88.6% of power generation. Thermal power was 35.4 TWh, with an average annual decline of 6.4%, accounting for 9.9%. Wind power and photovoltaic power generation, were 3.54 TWh and 1.64 TWh respectively. Non-fossil energy power generation has reached 321.5 TWh, accounting for more than 90%, an increase of 23.2 percentage points over 2010.

### 2.1.3 Analysis of Cross-Regional and Cross-Provincial Power Transmission

Through the launch of the flat-water period, widening the transfer market, opening new markets in the northwest, and launching multi-channel slewing and other methods to increase the delivery of Sichuan Electric, the external power supply continued to rise. In 2014, the external power supply exceeded 100 TWh. In 2017, the amount of electricity delivered 138.9 TWh, which was 6.93 times that of 2010, accounting for 38.9% of the total power generation, an increase of 27.1 percentage points over 2010.

Since the "Twelfth Five-Year Plan", the total external power supply has reached 620.6 TWh, equivalent to saving 248.24 million tons of standard coal, 168.8 million tons of dust emission, 618.73 million tons of carbon dioxide and 18.62 million tons of sulfur dioxide.

## 2.2 Current Status Analysis of Electricity Consumption

After the rapid development of the “Twelfth Five-Year Plan”, Sichuan has become a veritable power province. The development of power industry has experienced three stages: from a long-term power shortage, to the “sufficient shortage”, and then to the “sufficient and dry”, to fully support the Sichuan economy.

As of 2017, Sichuan's GDP has reached nearly 3.7 trillion, and its economic scale ranks first in the west and sixth in the country. The province's electricity consumption is 220.5 TWh, and the electricity load is 41.8 GW. Among them: the primary industry uses 1.38 TWh of electricity, an average annual increase of 0.2%; the secondary industry uses 137.74 TWh, an average annual increase of 1.2%; the tertiary industry uses 31.72 TWh, an average annual increase of 13.1%; the residential electricity consumption is 39.27 TWh, an average annual increase of 8.4%. The electricity structure has been adjusted from 0.9:73.7:9.8:15.6 in 2010 to 0.7:64.3:15.8:19.2, and the proportion of electricity used in the second industry has continued to decrease, reflecting the good results of the country's adjustment of economic structure. Among them, the decline in electricity consumption growth in high-energy-consuming industries, such as non-ferrous metal smelting and building materials, which is the main reason for the decline in electricity consumption in the second industry.

## 3. The New Situation of Sichuan Power Supply & Demand under the Supply Side Reform

### 3.1 Analysis of the Development Situation of the Power Supply Side

During the “Twelfth Five-Year Plan” period, Sichuan Hydropower entered a large-scale centralized production period. The province's hydropower has been put into production nearly 42 GW in the past six years, equivalent to the production of nearly two Three Gorges power stations. New energy has also entered the stage of rapid growth. Due to the macroeconomic impact, the growth rate of electricity consumption and power consumption in the whole society of our province has been declining year by year. The average annual growth in 2011-2017 are 5.2% and 6.4% respectively, the rapid increase in installed capacity and the continued decrease in demand for electricity within and outside the province, which has led to a serious excess of power generation capacity in the province.

The province's power supply is mainly hydropower, with many power sources, small single-unit capacity, and poor adjustment capability. According to incomplete statistics, there were more than 5,000 power stations in the province at the end of 2017. In the grid-connected power station, the capacity of the power station with the above-season adjustment capacity accounts for only about 40%. Most of the hydropower has no adjustment capability, and it is difficult to meet the requirement of the power-receiving provinces for stable power transmission.

Table 1. Adjusting the regulation performance of hydropower stations in 2017

Adjustment Performance	Number of Seats		Capacity	
	Value	%	Value/10,000 kW	%
Years Adjustment	3	1.1%	50	0.7%
Annual Adjustment	11	4.0%	642	9.5%
Incomplete Annual Adjustment	7	2.5%	786	11.6%
Seasonal Adjustment	11	4.0%	1291	19.1%
Day Adjustment	149	54.0%	3489	51.6%
No Adjustment	95	34.4%	505	7.5%
Total	276	100.0%	6763	100.0%

In the case of slow power consumption growth, the commissioning of large-scale new capacity will continue to reduce the utilization hours of power generation equipment. In 2017, the average utilization hours of power generation equipment were 3,805 hours, a decrease of 378 hours compared with 2012. In order to free up space for non-fossil energy units and reduce water abandonment, thermal power is in a state of shutdown and minimum output for a long time. At present, power generation enterprises are in a dilemma of operation, thermal power companies are almost completely depleted, and hydropower companies have lost 80%.

The contradiction between supply and demand of electricity in Sichuan is prominent. The phenomenon of thermal power outages and water and electricity abandonment has appeared in large numbers. The amount of abandoned water has increased year by year. In 2017, the peak water abandoned power reached 14 billion kW•h. According to the “13th Five-Year Plan” for energy development in Sichuan Province, by the year 2020, there will be an additional 10.5 million kW

of power generation installed, including wind and light of about 5 million kW. As the distribution of Sichuan landscape resources and hydropower are highly coincident, the new energy construction period is short, hydropower, wind power, photovoltaic power generation and other mutually squeezed development space, the utilization rate of existing power generation equipment may be further reduced.

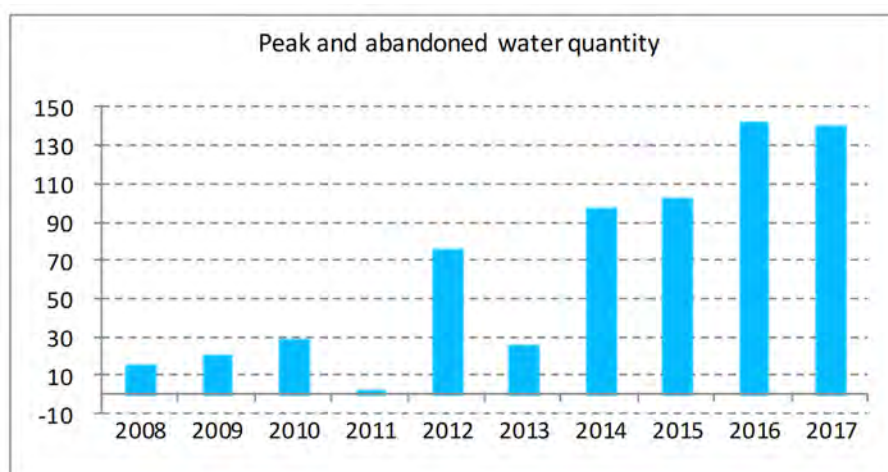


Figure 3. wasting water for peak modulation

### 3.2 Analysis of the Development Situation of the Power Demand Side

Under the “new normal” of macroeconomic growth shift and structural transformation, power consumption continued to be sluggish due to some factors, such as industrial restructuring, industrial production downturn, energy conservation and emission reduction, and temperature.

On the one hand, since the “Twelfth Five-Year Plan”, the annual growth rate of electricity of Sichuan Province is only 5.2%, reaching the lowest growth rate since the opening of the western region. On the other hand, the construction of Sichuan Power Grid has maintained a large-scale investment. The total investment of Sichuan Power Grid in the “Twelfth Five-Year Plan” has reached the highest level in history. The contradiction between “small” and “big” will inevitably lead to the unsustainable development of power grid and the development of the company. Under the supply-side reform, the state will continue to promote “three to one, one reduction and one supplement”. Traditional high-energy industries such as steel and electrolytic aluminum are the focus of the country's production capacity and face further adjustment pressure. In a certain period in the future, Sichuan's electricity market is expected to maintain a medium-to-low-speed growth trend. It is difficult to support the various investment and operation development of power grid companies by simply increasing the efficiency of electricity growth.

## **4. Suggestions**

### **4.1 Strengthen the Overall Coordination of Power Development.**

Strengthen power planning, and all types of power supply construction scale and production timing should fully consider market consumption capacity and power grid construction. Priority will be given to the development of large-scale hydropower projects with strong regulatory capabilities, delaying the construction of wind and photovoltaic power generation projects, and delaying the construction of new thermal power and natural gas distributed energy sources.

### **4.2 Accelerate the Construction of the Delivery Channel.**

Accelerate the construction of UHV long-distance transmission channels that match the clean energy base, such as Ya'an-Chongqing UHV AC, Yanyuan-Jiangxi UHV DC and other urgently needed delivery channels, as soon as possible to determine and speed up implementation, as soon as possible to ease the contradiction of Sichuan clean energy delivery to open the bottleneck of Sichuan's clean energy development.

### **4.3 Build a Strong Water and Electricity Consumption Guarantee Mechanism.**

Support to make the wind, light and water clean energy of Sichuan to bundling delivery. Besides, clear the proportion of external power supply, wind, light, water and electricity, and release the policy of mandatory consumption of clean energy by the provincial and municipal governments, supplemented by a reasonable price compensation mechanism.

### **4.4 Promote "Electric Energy Replacement."**

Do a replacement of the self-provided power plant, increasing the coal to electricity, heat pump, electric storage air conditioning, electric heat storage boiler, electric flue-cured tobacco, electric tea, port shore power and other alternative technologies.

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