



中国长江电力股份有限公司  
China Yangtze Power Co., Ltd.



# 中国水电开发情况简介

## Brief Introduction of Hydropower Development in China

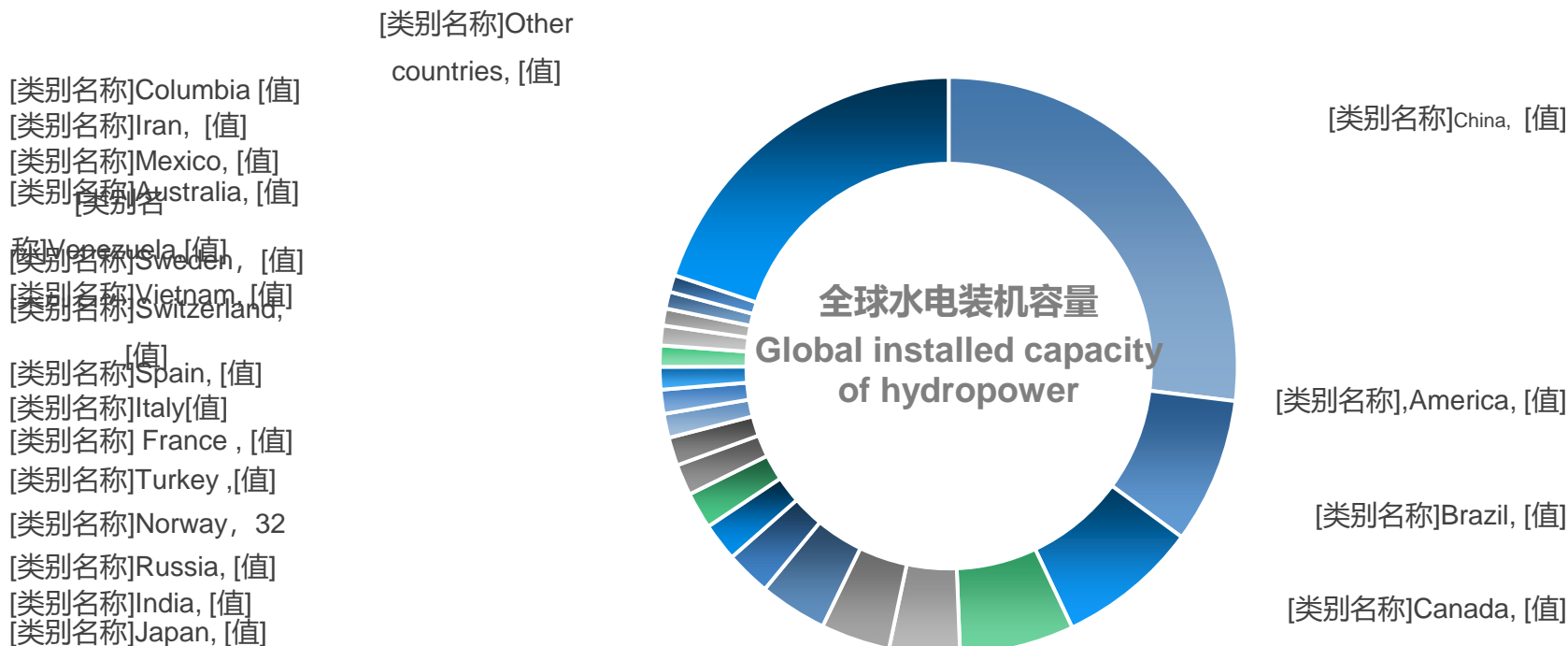
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谢峰 (XIE Feng)

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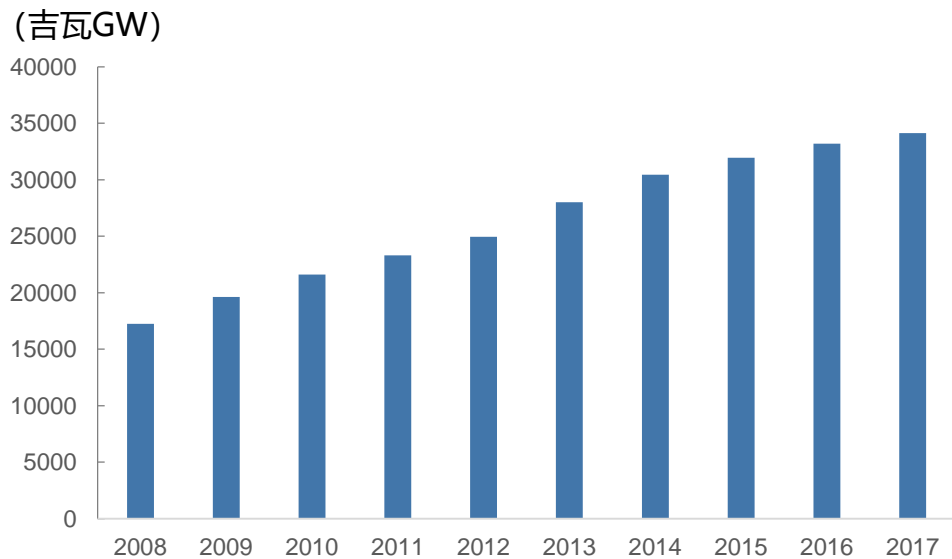
- ◆ 水电具有可再生性、清洁高效、安全稳定、价格低廉等优势，是技术最为成熟、最早进行大规模商业开发的可再生能源，全球主要工业化国家普遍开发比率较高。
- ◆ Hydropower is clean, efficient, safe, stable and relatively low in price. It is the most mature and the first renewable energy that has achieved large-scale commercial development. The degree of hydropower development in major industrialized countries in the world is generally higher.
- ◆ 中国作为全球水电资源最丰富的国家，无论是发电量、累计装机容量还是新增装机容量都是全球水电第一大国。
- ◆ With the most abundant hydropower resources in the world, China is the world's largest hydropower country in terms of power generation output, cumulative installed capacity and newly added capacity.



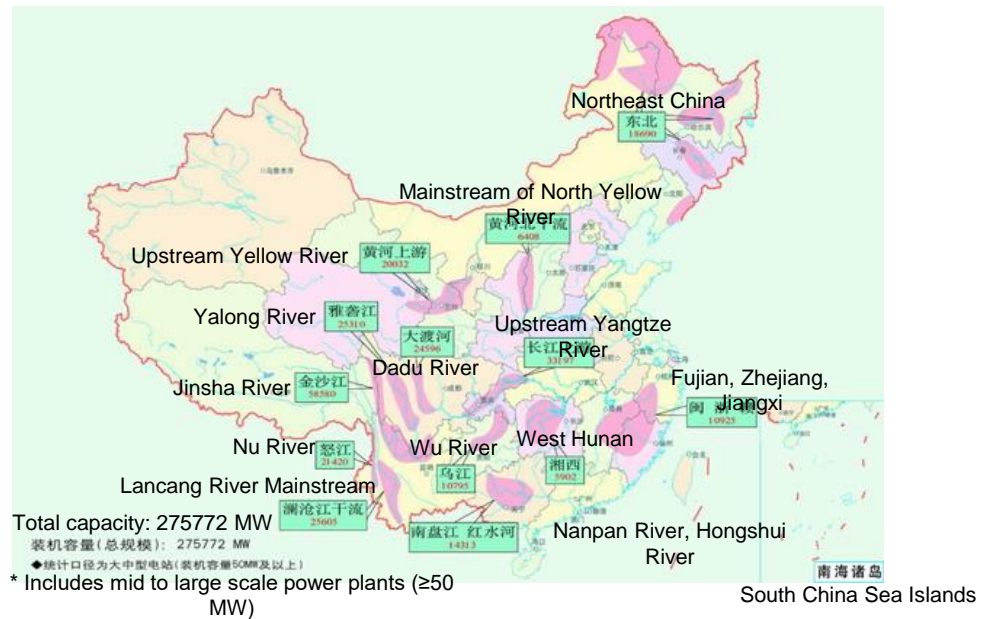


- ◆ 截至2017年底，全国电力装机总量达17.77亿千瓦，同比增长7.98%，其中水电装机总量在2017年底达到3.41亿千瓦，同比增速为3.9%。2008年时水电的装机容量仅为1.3亿千瓦，年复合增长率达到9.43%。
- ◆ By the end of 2017, the total installed capacity of electricity in China had reached 1.777 billion kilowatts, an increase of 7.98% over the previous year. The total installed capacity of hydropower reached 341 million kilowatts at the end of 2017, an increase of 3.9% over the previous year. In 2008, the installed capacity of hydropower was only 180 million kilowatts, and the annual compound growth rate reached 9.43%.

**中国水电装机容量**  
Hydropower installed capacity in China



**我国十三大水电基地分布图**  
Hydropower Bases in China

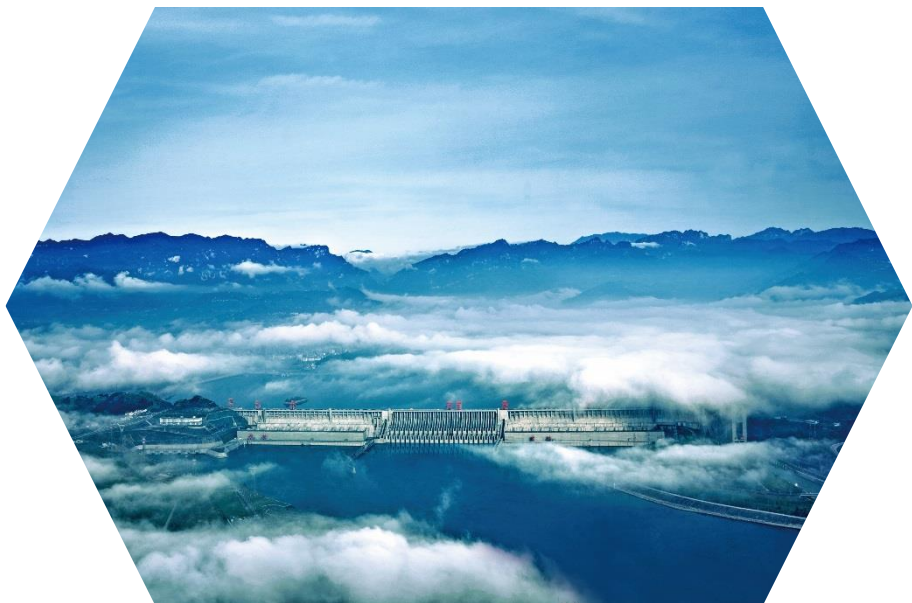




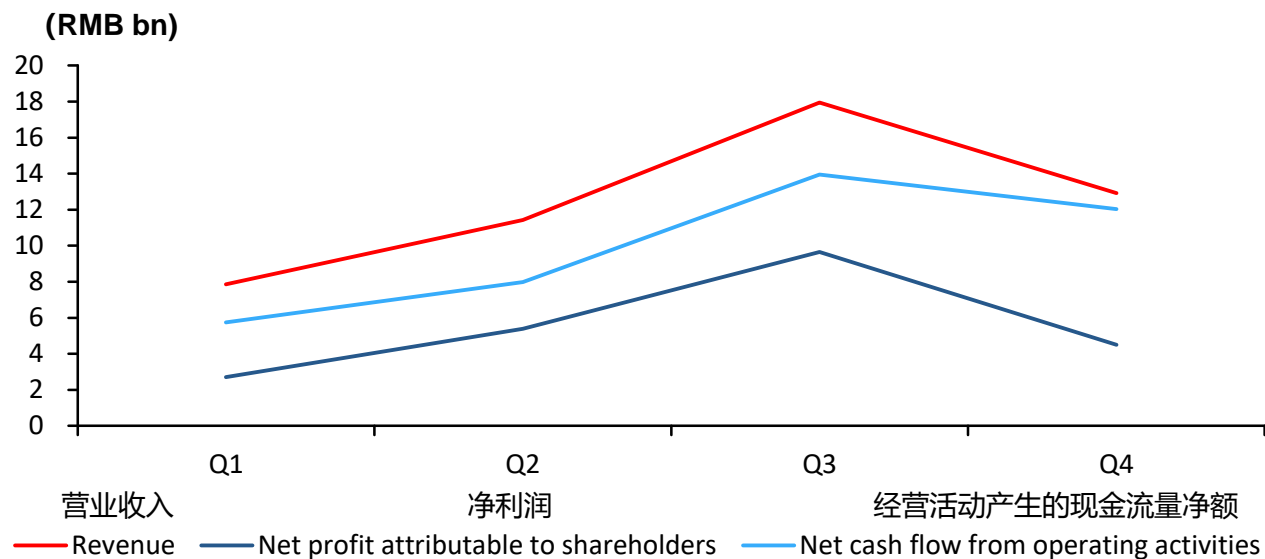
## 2.1 水电项目建设期长，工程投入大，现金流充沛

### 2.1 Long Construction Period, Large Investment and Abundant Cash Flow

- ◆ 水电站一般地处深山峡谷之中，一般建设规模大，建设周期长，移民人数多，投资回报率较低。但是一旦机组投产后，由于在原材料成本、运行维护费用、废料处理成本、稳定运行时间等方面优于其他发电方式，水电站具有利润率高，现金流充沛稳定的优势。
- ◆ Characterized by large construction size, extensive construction period, relocation of large amount of residents and low return on investment, the construction of a power station often requires a number of stages. However, once the generation unit is put into operation, hydropower station has the advantages of high profit margin and stable cash flow. It is superior to the other forms of power generation in terms of cost of raw materials, operation and maintenance cost, waste disposal cost, and stable operating hours.



2017年分季度主要财务指标  
2017 Quarterly Main Financial Metrics

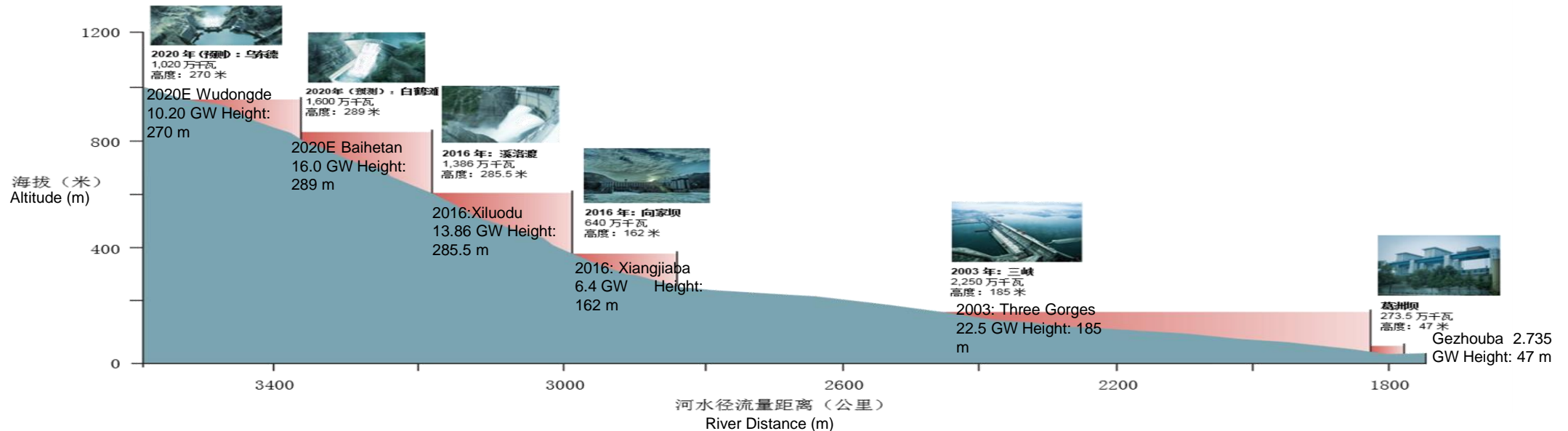




## 2.2 水电具有独特的内生性增长优势

### 2.2 Unique Organic Growth Advantage of Hydropower

- ◆ 水电的能源载体——水流可以在流经的每个电站中重复利用，便于调节。对于水电运营公司而言，能够控制的流域面积越广，掌控的总库容越大，水情预报的精度越高，调度方案越科学，电站群能够发挥的综合效益就越大。通过水文形势预测，调节下泄流量，实现同一流域电站群的优化运行，提高水能利用率和发电量。这是拥有同流域多电站群的水电公司重要的内生性增长来源。
- ◆ The energy carrier of hydropower – water flow – can be reused in every power station and can be adjusted easily. The discharge flow can be adjusted by predicting the hydrological situation to achieve optimal operation of the power station complex within the same river basin, so as to improve the hydropower utilization rate and power generation output. This is an important source of organic growth of hydropower company with multiple power stations in the same river basin.





### 2.3 水电站一般具有防洪、航运、补水等综合效益

### 2.3 Hydropower Stations Offer Comprehensive Benefits Including Flood Prevention, Shipping and Water Replenishment

- ◆ 水电站一般可以储存一定水量，按需要调节，使得河流更为符合人类的需要，发挥防洪、发电、航运、水资源配置、节能减排与生态环保等综合效益。

Since hydropower stations have reservoir capacity for water storage, they can store or release water based on the requirement, and can prevent flooding, generate power, serve for shipping, allocate water resources, save energy and benefit the surrounding environment.

### 2.4 水电为清洁能源，有优先上网优势

### 2.4 Enjoying Priority in Connection to Power Grid as Clean Renewable Power

- ◆ 国家对清洁能源发展给予鼓励与支持

The government has made a series of encouraging and supporting measures for the development of clean renewable energy



《中华人民共和国可再生能源法》  
“Renewable Energy Laws of PRC”



《关于有序放开发用电计划的实施意见》  
“Implementation Opinion Regarding the Discipline Opening of Power Generation and Power Consumption Programs”



《国家发展改革委 国家能源局关于有序放开发用电计划的通知》  
“Notice Regarding the Discipline Opening of Power Generation and Power Consumption Programs”



**世界水电行业的引领者**  
World Hydropower Leader

- 水电装机容量全球排名第一，达到4,549.5万千瓦，拥有世界前12大水电站中的3座
- # 1 globally with up to 45.495 GW installed hydro capacity, owning 3 of the 12 largest hydro power stations in the world
- 公司所属电站全部为100%可再生能源  
All power stations owned by the Company belong to renewables category
- 市值位居全球电力公司前列  
Global power company with leading market value



**竞争优势突出**  
Outstanding Competitive Strengths

- 中国主权信用评级，惠誉信用评级达到A+
- China sovereign credit rating with A+ from Fitch
- 电价低廉、运维成本低
- Low tariff and low O&M cost
- 财务状况良好。业绩持续稳定增长，现金流充沛
- Strong financial position with sustainable business growth and abundant cash flow

**拥有中国最优水资源**

Company has the Best Water Resources in China



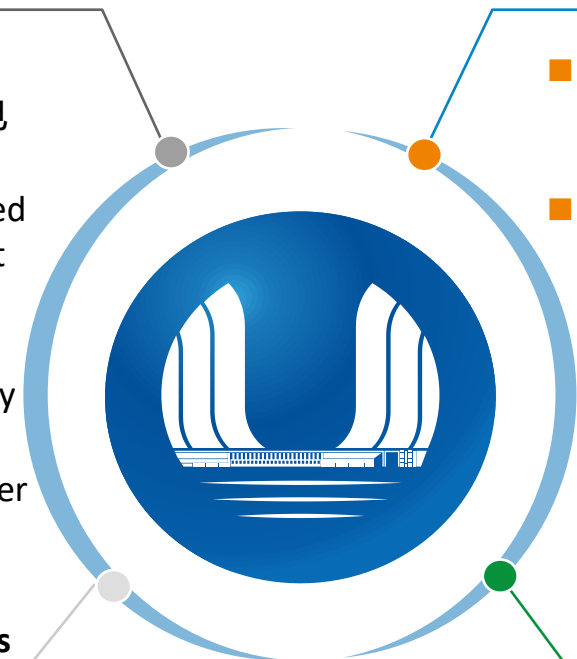
- 拥有中国最优水能资源的永久使用权  
Permanent use rights to the best water resources in China
- 所属电站均为国家重要战略工程，在防洪、发电、航运、补水等方面具有不可替代的重要地位  
All power stations are of strategic importance to China with irreplaceable position in terms of flood prevention, power generation, shipping and water replenishment

**为股东提供满意回报**

Attractive Shareholder Returns



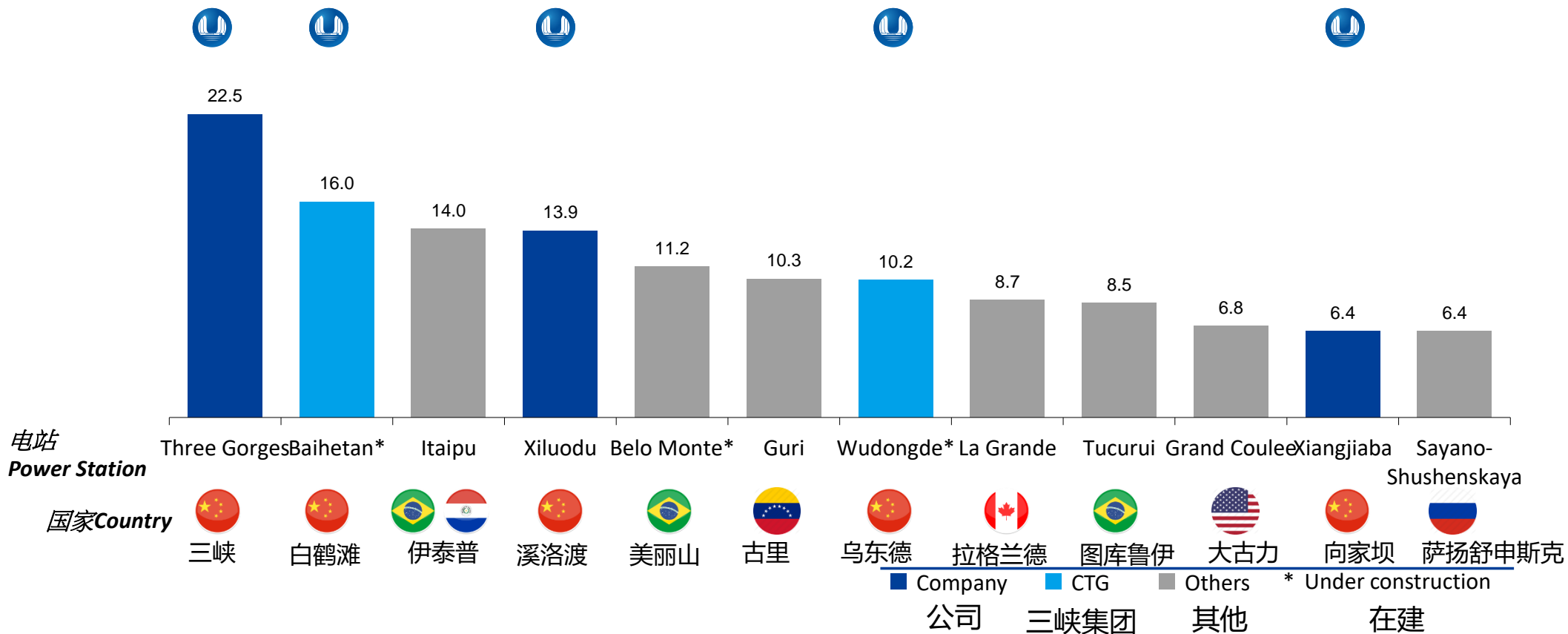
- 中国资本市场首次在公司章程中明确长达10年的高比例现金分红政策  
The 1<sup>st</sup> company in China's capital market with commitment of high percentage cash dividend policy for 10 years explicitly stated in its Articles of Association
- 2016年 – 2020年：每股不低于0.65元  
2016 – 2020: Dividend per share no less than RMB 0.65
- 2021年 – 2025年：分红比例不低于70%  
2021 – 2025: Dividend payout ratio no less than 70%





世界12大水电站装机排名  
Hydropower Stations in the World by Installed Capacity

装机容量 (万千瓦)  
Installed Capacity (GW)







**积极履行社会责任，奉献清洁能源**  
**Actively Fulfill Social Responsibilities and Offer Clean Energy**

**奉献社会**  
Dedication to Society

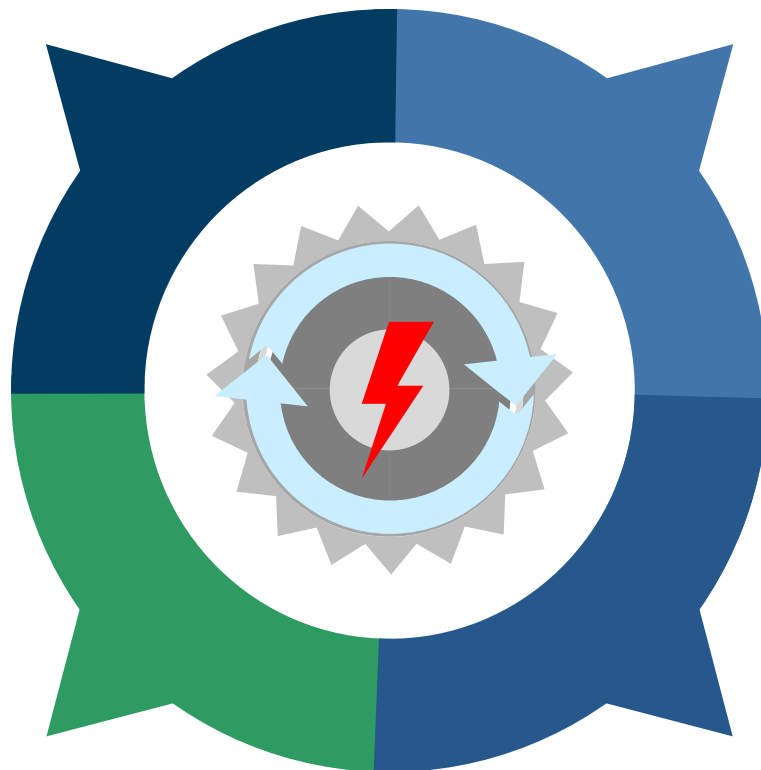
近5年缴纳税费564亿元；社会责任项目投入6,209万元；参与志愿服务700余次。

Tax payment in the last five years of RMB 56.4 bn. Input in social responsibility projects of RMB 62.1 mm. Volunteer services participated of over 700.

**低碳环保**  
Low Carbon and Environment Protection

自投产以来，节约标准煤63,721万吨；减排二氧化碳167,882万吨，相当于种植阔叶林460万公顷。

Since operation: 637.2 mm tons. CO2 emissions reduction of 1.7 bn tons. Equivalent to the effect of 4.6 mm hectares of forest planted.



**枢纽运行**  
Hub Operation

累计发电量20,424亿千瓦时；近5年累计拦蓄洪水707亿立方米，近5年累计补水1,315亿立方米。

Cumulative power output of 2.0 tn kWh. Cumulative flood retention in the recent five years of 70.7 bn cubic meters. Cumulative water replenishment in the recent five years of 131.5 bn cubic meters.

**厚德育人**  
Talent Retention and Training

培训总投入1,763万元，在职培训人次70,000余人次

Total training input of RMB 17.7 mm. No. of staff receiving on-the-job training of over 70,000



### 资源因素

#### Resource factor

- 优质大水电资源稀缺
- High - quality large hydropower resources are scarce.



### 政策因素

#### Policy factor

- 国家颁布《水电站发展“十三五”规划》将“大力推进”西部地区大型水电开发调整为科学有序开发
- The state promulgated the " 13th Five - Year Plan for Hydropower Development" to adjust " vigorously promote" large-scale hydropower development in the western region to scientific and orderly development
- 税收（增值税、所得税等）优惠政策到期和降低，增加发电企业运营成本
- Tax ( value-added tax, income tax, etc. ) preferential policies expire and decrease, increasing the operating costs of power generation enterprises.



### 社会因素

#### Social factor

- 随着社会的发展，对移民安置、环境保护的要求越来越高
- With the development of society, the requirements for resettlement and environmental protection are becoming higher and higher.