The Research on Data Centre Construction Invested by Power Grid Company Mode

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Abstract. Data Centre is one of the hardware facilities of the present stage social development trend. It will be rapid developed in the next few years. While not only its construction cost is high, but its operation cost is high. The State Grid Company is undergoing a transformation and become to a comprehensive energy service provider instead of power suppliers. It has the advantages in the aspects in cost, power supply reliability and operational maintenances if it takes part in Data Centre construction. The investment is in line with the development strategy of SGC, belongs to the high quality of investment projects and it is the new investment direction of SGC.

1. Introduction
With the development of cloud computing, big data, the source of data for the Data Centre has been extensive more and more. The data equipments are accessed diversified more and more and the data capacity has become larger whose process need to be rapid and efficient. All of these made it definitely puts forward higher requirements to the Data Centres. In China, the Data Centre is mainly on the Internet and communications enterprises. The State Grid Company (SGC) has established some platform Data Centres only in the need of business such as own SG186 system, ERP system. The SGC is promoting the fusion of the Internet and the State Grid, building the Energy Internet and ensure itself to be a world-class Energy Internet company with global competitive abilities. It has announced that the SGC must set up the “Ubiquitous Power Internet of Things” within 3 years. So it is inevitable to strengthen the construction of its own Data Centre not only the SGC but also every provincial Power Grid Companies.

2. The data centre

2.1. The characteristics of the data Centre
The characteristics of the Data Centre which are the most important requirements are:

1. The energy must be enough.
   Like many Data Centre constructions in our country are built in the northwest and southwest where are full of the coal, water, wind and light energies corresponding.
2. The Data Centre should be stable and reliable.
To the Data Centre, the environment temperature should be stable and the requirements of power supply quality should be very high. The safety, stability and reliability of power supply are the top priority[1].

3. The Data Centre should be energy conservation and environmental protection.

The operation cost of Data Centre is very high. About 50%-70% of it is electricity which includes the cost of equipment utilization, fan, air conditioning, etc.

It is shown that the construction safety, easy maintenance of power supply system can enhance its competitiveness and the development trend of Data Centre must be green Data Centre.

2.2. The market scale is huge

There are nearly 1/3 large Data Centre in China focused on the Beijing, Shanghai and Guangzhou city. It is the same as the global trend that the Data Centres are mostly centralized in the economic developed area. The market participants include the telecom operators (China Telecom, China Mobile and China Unicom) which are the main force of the construction of the Data Centre. Each of them has high significant advantages in aspect of policy, capital; human resources and more than 60% of the Data Centres are held by the three major telecom operators.

According to the China IDC data, the market scale of the IDC will be close to 190 billion Yuan in 2019. In 2016-2019, 4 year compound growth rate will be 21.1% which is significantly ahead of the international level. The core driving force to the market scale growth is the demand of function outsourcing stable of enterprise IT and Vertical industry customers such as the Cloud services, mobile Internet, video, online games.

Vertical industry customers such as, and function of enterprise IT outsourcing stable growth of demand, is the core of pulling the size of the market driving force [2].

From 2015 to 2020, the compound growth rate of cloud services market in China is 29.4% while the overall market scale accounts for only 4% of global cloud services market and it has larger development potentiality. As the Alibaba Cloud is the leading enterprises of domestic cloud services in China, the 10-year-compound growth rate of it will be 56.5% from 2015 to 2025 which is forecasted by Credit Suisse AG.

The high improvement of new market scale is also benefit from the increasing coverage and declining rates of 4G networks, which makes the 4G network user coverage growth rapidly. This is also greatly promoted the video consumption and the increase in data traffic. In the future, as the significance revolutionary of 5G mobile communication network researches and application which is lead by China, the mobile Internet customer demand is expected to have a more substantial growth.

In addition to the demand of mobile Internet, more and more enterprises pay attention to the use of the Data Centre. Each IT function outsourcing of big enterprise can make the enterprise focus much on the development of its core business and at the same time reduce its costs. Compared to traditional industry, the financial enterprises care about data security and recovery requirements higher and it make them prefer to the high performance and reliable Data Centre.

2.3. The growth of market supply sides goes slowly

While the demands are continues to increase, the growths of market supply sides have fallen sharply and the products demanded exceed supplied. The Data Centre supply is only 12.4% in 2016 and it is expected to further reduce. Although the growth is high, the stock scale is still small, less than a quarter of the United States.

In summary, there are 3 aspects that why the growth of supply-side is slowdown:

1. The energy consumption controlled by government.

The power consumption of Data Centre is much higher than ordinary buildings as the power supply system of Data Centre should support a large number of servers and their attendant equipment together.

To the regions especially the major cities in China which are short of electric power, both the national development and reform commission and the State Grid have greatly limited the number and scale of Data Centres for caring about the examination and approval of energy consumption.
2. Secondly, there is another important factor that the urban land of first-tier cities is limited. As now the Data Centres are mainly small and medium-sized, the unit operation cost is high and can't achieve scale effects. The urban land is now supply structural imbalanced while the first-tier cities and city core network node is especially significant.

3. The comprehensive energy service mode

3.1. The comprehensive energy service
The comprehensive energy service is a new type of service to satisfy the diversified energy production and consumption of clients. It includes such as energy Resources planning and design, project investment and construction, diversified energy services and investment and financing service operation etc.

The comprehensive energy service is an advantage service mode. It is conformed to the rapid development of our country's economy and the improvement of residents' living standards. Now more and more power users are paying attention to the quality of electric power. On supply side it is necessary that the structural reform of electric power and electric power service requirement has quietly shifted from "quantity" to "quality".

3.2. The kinds of services
At present, to carry out comprehensive energy services has become an important development direction of energy power companies.

It has several basic kinds of services as follow:
1. Comprehensive supply of power
   There are some professional terms of the comprehensive supply of power such as Products integration, Channel integration and Distributed multi-energy complementary system. The Products integration means provide terminal with coal, electric power, coal gas and other energy products at the same time; The Channel integration means operating a variety of energy network at the same time. The different energy sources can be integrated into the goal district and supply energy with single channel, so the Distributed multi-energy complementary system means solving demand of the gas, refrigeration, heating, electricity and other energies together[3].
2. Improve the energy efficiency, reduce the energy cost
   It means to promote of the energy-saving equipment, the implementation of energy saving transformation on “Hardware” and optimize the energy solutions, improve the consumer combination, etc on “software”.
3. Equipment maintenance
   The market entry point is the traditional customer services such as equipment maintenance and so on which is relied on the advantages of technologies and equipments. Diversified business of Customer needs can realized through the methods like monitoring, energy saving transformation, alternative energy, energy custody etc.
4. Cleaned Micro-Grid
   The Micro Grid which is integrated with Consumption and Energy Supply is supported by distributed new energy, energy storage technologies[4] which is indicated by Wu Geng, Wu Qingguo, and Wang Haojing(2019).
5. Intelligent Home
   Based on "Intelligence+ electrification", power supply scheme is proposed for full living service design and retrofit which is covering equipment fabrication, intelligence control system as such.
   Many large foreign energy power enterprises focus on the 3, 4 and 5.

4. The significance and advantages

4.1. The strategic goal of company
The SG Company has been clear about the strategic goal is to: build globally competitive world-class energy Internet companies. The Data Centre is one of the bases of Internet Companies. In recent, the No. 1 files of State Grid [2019], clearly put forward: "In 3 years of efforts, strive for and preliminary built to the globally competitive world-class energy Internet companies before 2021"; "Research on the new model which the explore the use of substation resources construction operation filling in electricity (energy storage station) and Data Centre, ... Promote collaborative development and mutualism between the emerging business and grid business".

4.2. The advantages of cost
Electricity is the main operating cost of the Data Centre, and the grid company can reduce and control the expenditure through buying/selling electric mode. So the cost advantage is obviously than other enterprises on electricity which is an important and basic economic indicator.

4.3. The advantages of technologies
The SG Company is a professional company of electric power with the incomparable advantages such as technologies, capital, talents etc. It can supply the best electric power and has advantage in aspects of equipment operation and maintenance. It also can settle the electric power quality problem immediately. The SG Company has the powerful abilities to settle the electric power quality problem immediately.

4.4. The advantages of land
According to the scale of substation at present and the equipments are integrated more and more, it can make full use of existing land of substation to construct the Data Centre, avoid the influence factors such as land acquisition and can layout rapidly.

4.5. The advantages of cooperation mode
Data Centre belongs to heavy Fixed Assets Investment. The service object is different with different construction purpose. As its high construction and operational cost, many domestic enterprises may not consider to build it while take into account to implement the requirements by the way to rent.

5. Investment and Profit
Refer to the online information; a Data Centre of some industrial park was built as the large Data Centre construction and the overall planning construction area is 30000 m². It was designed to hold about 3000 cabinets and total investment is 700 million Yuan. According to the overall planning and implemented by Stages, the first construction scale is 300 standard cabinets which will increase with the future market demand gradually, eventually it reach to 3000.

In No.1 stage, the investment of Data Centre is 65 million Yuan. In first year, 300 sets of equipments and system engineering cabinets including power supply, refrigeration, fire control, security, etc. should be equipped. 1200 sets of servers should be configured. It needs to invest 222.95 million Yuan and the cloud platform constructions cost 25 million Yuan. The total cost is 312.95 million Yuan. The basic operating cost is 58.96 million Yuan a year.

General the economic benefits of the Data Centre can be realized by two rental ways which are renting the cloud platform and rental cabinet. As the12000 cloud servers are used some cabinets, there are about 1500 sets of cabinets can be provided to rent. As the price of each rack leasing market is about 120000Yuan per year, the annual revenue could be 180 million Yuan.

6. Conclusion
The Data centre will be rapid developed in the next few years and is one of the hardware facilities of the social development trend at present. It is proved that the investment of Data Center construction is in line with the development strategy of SGC and it belongs to the high quality of investment projects. The investment scale is larger and the income is stable, and companies involved in certain advantages,
cost and construction suggest that it is one of the best projects to implement when SGC is transformed from a comprehensive energy service provider instead of power suppliers.

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8. References
[1] Shi guowei (2019) “The analysis of cloud computing Data Center construction pattern”, China Management Informationization 22(10) (2019): 86-87.
[2] Yu Jiangtao(2019). "Research on Planning and Construction of Data Center Computer Room", China Computer & Communication 10 (2019): 231-232.
[3] Lin Li, Cai Xuexuan(2019). "Source-load Cooperative Operation Strategy of Integrated Energy Service Provider Based on Wind Power Accommodation Demand", Power System Technology 43(7) (2019): 2517-2527.
[4] Wu Geng, Wu Qingguo, and Wang Haojing. etc. (2019) "Energy purchasing strategy of multi-energy service provider considering risk aversion", Electric Power Automation Equipment 39(6) (2019): 12-20.