ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752

Research on power gathering problem and power transmission strategy in Guangxi coastal area

Hui Qin[1,a], Lijuan Huang[1,b] ,Zhen Pan[1,c] ,Hengwang Zhou[1,d]

[1]Power Grid Planning Research Center Guangxi Power Grid Co., Ltd,Nanning, China

[a]517544316@qq.com, [b]Huang_lj@gx.csg.cn, [c]Pan_z@gx.csg.cn, [d]Zhou_hw@gx.csg.cn

Abstract. the construction of power supply is affected by resource conditions, plant construction conditions, load distribution and power grid structure, which shows a trend of more and more centralized distribution.If the power supply is too concentrated, the short circuit current will be increased, the risk of system security and stability will be increased, and the regional power transmission channel will be insufficient.The key to solve these problems is to find a suitable power transmission strategy.On the basis of fully summarizing the typical structure of domestic power grid, this paper puts forward the construction strategy of group transmission and layered transmission, and applies it to the construction of clean energy transmission grid in Guangxi coastal areas.

Keywords: Group delivery;Layered delivery;aggregation power supply; Power transmission

1. Introduction

With the increase of load and the expansion of power system scale, the trend of local centralized distribution of power supply construction is more and more obvious because of resource conditions and other factors.From the national perspective, due to the characteristics of resource distribution, the whole country presents the pattern of transmitting power from west to East;From the perspective of China Southern Power Grid, due to the relatively good conditions of hydropower and coal power resources in Yunnan and Guizhou, the overall power flow of power transmission from the west to the east also appears.For Guangxi power grid, due to the lack of its own coal resources, affected by the railway transportation capacity and long distance, the economic benefit of building inland coal power is poor, and the investment enthusiasm of power plants is not high.However, Guangxi coastal areas have relatively good resource conditions, plant construction conditions and economic benefits, and a large number of coal-fired power and nuclear power have been distributed, and the whole Guangxi presents the characteristics of centralized distribution of coastal power.In the future, Guangxi coastal areas will continue to plan and build large-scale nuclear power relying on their advantages. In addition, under the background of "carbon peak, carbon neutral", offshore wind power in Guangxi coastal areas will also enter a period of large-scale development.Overall, with the further development of clean energy in Guangxi coastal areas in the future, the characteristics of power gathering will be more significant.

However, the centralized layout of power supply will bring a series of problems.Firstly, the short-circuit current of some hub stations will increase after centralized layout, which will affect the equipment selection;Second, large-scale units gather, and the loss of excitation fault or long-distance power transmission will affect the safety and stability of the system;Third, the power transmission channel may be insufficient, which leads to problems such as nest power. Therefore, it is necessary to coordinate the contradiction between regional power consumption and power transmission, and seek appropriate power transmission strategy.At present, there are few studies on power aggregation and related power transmission strategies in the existing literature. Among them, literature [1-2] analyzes the regional layout and power supply structure of China's power industry; literature [3] studies the security and stability of large-scale new energy transmission; literature [4] takes the power transmission of Western Shaanxi power grid as an exampleThe paper puts forward the measures to promote the power transmission in terms of the price and market of power transmission.Reference [5] proposed that Inner Mongolia power grid should adopt the "network to network" transmission mode.

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752

The existing literature only put forward suggestions on the layout and structure of power supply, but did not carry out relevant research and Analysis on the causes and problems caused by power aggregation, and failed to conduct systematic research on the grid construction method of power gathering area.In this paper, we will deeply analyze the causes of power accumulation and some problems. Taking Guangxi coastal power grid as an example, we will put forward corresponding solutions. We will focus on the strategy of sending out the power gathering areas. We will put forward two kinds of network construction strategies: group type and layered type, to provide guidance for power grid planning and construction, and to promote clean energy consumption.

2. Analysis of Power Supply Aggregation

2.1 Causes of Power Accumulation

The main reasons for the concentration of power supply are as follows.

One is limited by resource conditions.China's resource distribution is not balanced. The Middle East region has a large demand for power, but less energy, while the western region is rich in energy. Therefore, the state has formulated the strategy of power transmission from the west to the east to meet the contradiction between the demand of power transmission from the resource side and the demand of power consumption at the load end.As far as Guangxi power grid is concerned, hydropower has entered the stage of deep development, and the installed capacity of developed hydropower accounts for more than 90% of the economically exploitable capacity.In terms of coal and electricity, Guangxi has a small amount of coal resources and poor occurrence conditions. Due to the comprehensive environmental protection requirements, plant site resources, coal transportation capacity and other factors, the space for subsequent coal power is limited.In terms of nuclear power, Guangxi's coastline is about 1000 kilometers long, which is in the region encouraged by the state to develop nuclear power, and has favorable conditions for the construction of nuclear power.In terms of gas and electricity, restricted by gas source and gas price, Guangxi has no price advantage in using natural gas for power generation to meet the rapid development of electricity demand in the region.In terms of wind power, with the decrease of wind power development cost and the continuous improvement of development technology, Guangxi wind power development will still maintain a rapid growth rate;Guangxi is rich in offshore wind power resources, and will be in the initial stage of development during the "14th five year plan".In terms of photovoltaic power generation, combined with the resource situation, the installed capacity of photovoltaic in the long term can reach about 8000mw.

From the perspective of resource conditions in Guangxi, due to the fact that wind power and photovoltaic power only have electricity efficiency, and power efficiency is poor, and hydropower and gas power follow-up resource conditions are poor, for a period of time in the future, especially during the "fourteenth five year plan" period, in order to meet the power demand of Guangxi, new nuclear power and coal-fired power can only be built.In Guangxi, nuclear power is mainly concentrated in coastal areas, and better coal-fired power plants are mainly concentrated in coastal areas, which leads to the situation that power sources in Guangxi are concentrated in coastal areas.

Second, it is affected by the conditions of plant construction.Generally speaking, the construction of power plant is arranged in the location with better conditions, and the site for subsequent expansion such as phase II and phase III is reserved.In order to make use of the convenient transportation, transportation and other public facilities in advance, the subsequent power supply construction will be more willing to expand on the original site, resulting in further concentration of power supply.The layout of nuclear power plants mainly depends on the resource conditions of nuclear power plant sites. At present, the country has not opened inland nuclear power. Guangxi, taking advantage of its coastal nuclear power plant site advantages, will focus on the distribution of nuclear power in coastal areas. Fangchenggang nuclear power plant and Bailong nuclear power plant are planned to have three phases, with a large scale.The development of thermal power in Guangxi needs to transfer coal from outside the region or overseas. Guangxi is located in the south

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
of the motherland. Due to the influence of railway transportation capacity and long haul distance, the coal price increase is high and the economic benefit is poor;Coal is transported to coastal areas by sea, and then transported inland by railway. The increase in secondary transportation price is also high. Therefore, from the perspective of return on investment, most power owners are not enthusiastic about inland power supply investment. Guangxi coal and power are mainly concentrated in coastal areas, including Fangchenggang power plant planning for phase II and Qinzhou Power Plant Planning for three phases.

Third, it is limited by the power grid transmission channel.At the initial stage of power supply under construction in some areas, relevant external transmission channels have been constructed.With the subsequent growth of local load, if the new power supply is not added in time, the utilization efficiency of the transmission channel will decline, and the grid assets will not be fully utilized, resulting in the waste of investment;At the same time, if the new power supply in other areas may need to add new transmission channels, the power grid investment will increase, and the economic benefits will be poor.Therefore, the existing power transmission channels are more likely to be affected by the construction of external power transmission channels.There are five transmission channels in the coastal areas of Guangxi, and there is still a certain margin at present. Therefore, it is appropriate to build power sources in coastal areas and use the existing channels to deliver power.

Fourth, it is limited by the load distribution.The construction of power supply is mainly used to meet the increasing demand of load. Therefore, in order to reduce the large-scale transfer of power and reduce the system network loss, it is more reasonable to build power supply in the load center.However, the general load center has a higher degree of urbanization development, higher requirements for environmental protection, more resources such as line corridors, and poor power construction conditions. Therefore, the power supply is generally distributed in the area close to the load center, which results in the power supply concentrated in the area near the load center.The load centers of Guangxi are concentrated in Nanning in Southwest Guangxi and Yulin in Southeast Guangxi, and the coastal areas are closer to the load centers. Therefore, Guangxi power supply is more arranged in coastal areas to supply load centers nearby.

2.2 Analysis of Power Accumulation

Centralized power distribution can make use of the advantages of resources, plant construction and transmission channels to improve the utilization efficiency of the whole energy resources and reduce the power consumption cost of the whole society. However, the power gathering will bring a series of problems to the power system.

One is that the short-circuit current of some stations increases or even exceeds the standard, which affects the equipment selection and system safety.When there are many incoming and outgoing lines in the substation, if there are more power plants connected, each power plant will provide thousands of a short-circuit current, which may lead to high short-circuit current in the substation, or even exceed the interrupting capacity of the equipment, thus affecting the safety of the system.According to the annual operation mode of Guangxi power grid in 2020, the short-circuit current at 220 kV side of 500 kV Jiulong substation has reached 45 Ka.With the subsequent construction of 500kV substation in coastal areas and a number of power sources such as Fangchenggang nuclear power phase II, Shenhua Beihai power plant, Beihai phase II and Qinzhou phase III, the short circuit current of the system is further increased.If no measures are taken, the short-circuit current at 220 kV side of Jiulong substation will exceed 50 Ka, exceeding the capacity of the equipment, and there is a safety risk in the system.

Second, large-scale unit aggregation may bring system stability problems.The stability problems in power gathering areas may be caused by three aspects: one is the stability problem caused by the long transmission line; the other is the stability problem caused by the weak terminal power grid; the third is the stability problem caused by cascading failure of large-scale units.During the "14th five year plan" period, the coastal areas of Guangxi will gather Fangchenggang nuclear power and

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
Fangchenggang power, totaling 4530mw nuclear power and 14130mw coal-fired power.500 kV AC may be used for the transmission of these power supplies, and the length of the transmission line is relatively long. For example, the line from Fangchenggang to Chongzuo is about 160 km, and that from QinZhou to Guigang is about 180 km.For long-distance power transmission, the system at both ends is not closely connected and the line impedance is large, which may cause stability problems.Guangxi coastal power grid is relatively strong, there is no stability problem caused by the weak terminal power grid.However, due to the aggregation of 6 units in some power plants, the cascading failure of units may bring stability problems, which needs to be studied and analyzed.

The third is that the accumulation of power leads to the shortage of power transmission channel.Generally, the power gathering area can not absorb all the electricity locally. In order to avoid the nest power, the power needs to be sent out on a large scale.As a result, the power transmission channel should not be planned in advance due to the lack of power transmission corridor.According to the special research results of Guangxi's "14th five year plan" and medium and long term power planning, the local power load of qinfangbei area along the coast of Guangxi will reach about 9200mw in 2025, the available capacity of regional power supply will reach 18200mw, and the power profit and loss will be close to 8400mw.At present, there are only five 500 kV transmission lines in the coastal area of Guangxi, and the existing external transmission channels can not meet all the power transmission demand of coastal areas, so it is necessary to add new transmission channels.However, the coastal areas of Guangxi have concentrated industrial distribution, special topography, limited available land resources and tight transmission corridors.Therefore, it is necessary to plan ahead of time, coordinate the contradiction between power construction and land resources, and ensure the sustainable and healthy development of power industry in coastal areas..

3. Research on Countermeasures of Power Supply Aggregation Problem

For the three typical problems caused by power accumulation, we can usually find countermeasures from three aspects.

First, the power supply is divided into voltage levels and decentralized access.By reasonably arranging the power supply access voltage level, for example, 600MW and below units are considered to be directly connected to the voltage level of 220kV and below, and 1000MW units are considered to be connected to 500kV voltage level. On the one hand, it can better solve the system stability problems caused by the cascading failure of units caused by multiple power centralized access,On the other hand, the decentralized connection can prevent the high short-circuit current of hub substation caused by centralized power connection. Finally, it can fully coordinate the relationship between local power consumption and power transmission, avoid the large-scale transfer of power flow, and create conditions for direct power transmission.

The second is to build a reasonable grid scheme.The main reason for the increase of short-circuit current level is the improvement of system connection. It is easy to implement and economical method to limit the short-circuit current by properly changing the system structure.Through reasonable grid construction, reasonable partition scheme is constructed, reasonable operation mode is adjusted, appropriate power supply is arranged for regional power load, unnecessary connection between power grids is reduced, and short-circuit current of system can be effectively reduced.At the same time, through the reasonable grid structure, part of the external power supply can be packaged separately, which makes it possible to send out separately. The power grid structure will be more clear and reliable, and reduce the system security risk.

Third, the system uses additional equipment to solve the problem of high short-circuit current or safety and stability.In addition to the optimization of power grid structure, for the problem of high short-circuit current, high impedance transformer, small reactance at transformer neutral point, series reactor and fault current limiter can be used to reduce the short-circuit current.In terms of security and stability, the stability problem caused by the long transmission line can be improved by

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
adding series compensation;The stability problem caused by too weak terminal power grid can be solved by improving the technical parameters of the unit, installing SVC, SVG and condenser.

type	name	NO.	scale
Coal power	Qinzhou phase I	1	2×630
	Qinzhou phase II		2×1000
	Qinzhou phase III		2×1000
	Beihai power plant	2	2×320
	Beihai Power Plant Phase II		2×660
	Shenhua Beihai power plant		2×1000
nuclear power	Fangchenggang nuclear power phase I	3	2×1086
	Fangchenggang nuclear power phase II		2×1180
	Fangchenggang nuclear power phase III		2×1250
	Bailong nuclear power plant	4	6×1250
	Danzhujiang nuclear power plant	5	6×1250

Fig.1 installed capacity of main power supply in Guangxi coastal area (MW)

4. Research on Power Transmission Strategy in Source Concentrated Area

4.1 Analysis of Power Transmission Technology

The most important problem of power gathering area is to find a suitable power transmission scheme.Reasonable power transmission scheme needs to effectively connect regional power supply access and power grid scheme construction, and solve the problem of high short circuit current and potential security and stability.Considering the construction of domestic power grid, the power transmission scheme mainly includes 500 kV AC, UHV AC, conventional DC and flexible DC transmission technologies.

1) 500 kV AC technology.According to the power system design manual, the transmission capacity of AC transmission lines at different voltage levels shows that when the transmission capacity of 500kV AC line is 600MW ~ 1500MW, the transmission distance is 400 ~ 1000km.The straight-line distance between qinbeifang and the load center of southwest and Southeast Guangxi is within 300 km, and the linear distance to the load center of North Guangxi is about 450-550 km.Therefore, the 500 kV AC transmission scheme is suitable for qinfangbei power transmission.
2) UHV AC technology.UHVAC transmission technology can be used to build a high voltage level of the main grid, mainly to strengthen the synchronous connection between regions, but also can be used for power transmission.Since the transmission network of UHV is flexible, it is necessary to form a transmission network with multiple transmission modes.However, UHV AC transmission technology expands the scale of synchronous power grid, improves the complexity of synchronous power grid, and increases the risk of Power Grid Accident expansion;At the same time, the investment of UHV AC transmission network is high and the economy is poor.In view of the fact that UHVAC transmission technology needs to form a network in order to give full play to its economic benefits, the adoption of UHVAC technology in Qinbei defense area along the coast of Guangxi should be considered in combination with the main network architecture of Guangxi and even the whole southern power grid.According to the 13th five year plan report of China Southern Power Grid Corporation, the technical route of China Southern Power Grid mainly uses DC transmission technology as the main means of long-distance transmission. Meanwhile, the scale of synchronous power grid is reasonably controlled, and the development of UHV AC main grid is not clear.To sum up, the technical

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752

scheme for the construction of UHV AC power grid in Guangxi coastal areas is not considered.

3) Conventional DC technology.DC transmission technology can be applied to large capacity and long-distance power transmission, and DC transmission can effectively save the line corridor, improve the transmission efficiency, and reduce the investment and operation cost of network construction.DC transmission has little impact on the existing 500 kV AC main grid, which can realize the asynchronous interconnection between the sending and receiving power grids, and to a certain extent, promotes the simplification of the network structure.In recent years, China's DC transmission has made great progress, and a number of DC transmission projects have been put into operation.In terms of voltage level, they are mainly ± 500kV, ± 660kV, ± 800kV;In terms of transmission capacity, it ranges from 3000MW to 10000mw;In terms of transmission distance, the vast majority of DC transmission projects are trans provincial and trans regional projects, and the transmission distance is generally more than 1000 km.In terms of transmission distance, the conventional DC scheme is not suitable for the transmission channels in southwest and Southeast Guangxi.In case of power transmission in northern Guangxi, the ± 500kV DC scheme can be considered in terms of transmission distance and transmission capacity.

4) Flexible DC technology.Compared with conventional HVDC, flexible DC transmission technology has the advantages of fast and flexible power regulation, power supply to passive network, no commutation failure and dynamic reactive power compensation for the system, but the project investment is relatively high.Flexible DC has broad application prospects in the fields of large capacity clean energy grid connection and large regional power grid interconnection, which can solve the risk problem of receiving end power grid caused by multiple DC centralized drop points.At present, the typical flexible DC transmission projects put into operation in China include Wudongde power station, Guangdong Guangxi UHV multi terminal DC demonstration project, etc.The main flexible DC projects put into operation and under construction in China are mainly used in large-scale new energy transmission and reducing the operation risk caused by multiple DC concentrated drop points of receiving power grid.In view of the types of offshore power supply and the characteristics of receiving power grid in Guangxi, it is not necessary to use flexible DC.

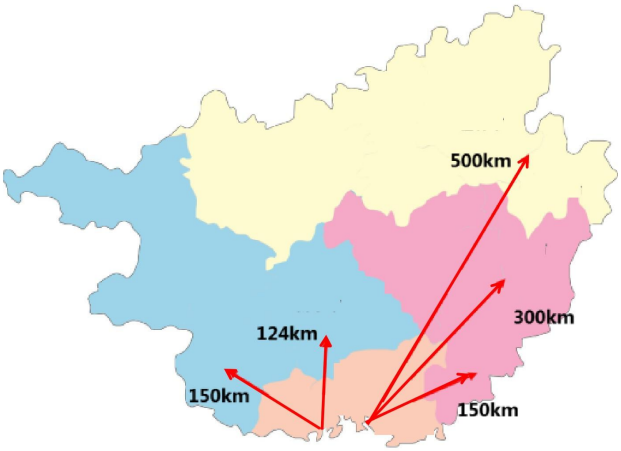

Fig.2 Schematic diagram of distance from Guangxi coastal power transmission to load center

4.2 Study on 500 kV AC Power Transmission Mode

From the analysis of power transmission technology, it can be seen that 500 kV AC technology is most likely to be used for power transmission from Guangxi coastal power gathering areas.Combined with the actual external transmission scheme of domestic power gathering areas and referring to the planning results of Western Mongolia power grid, Guangdong Eastern Guangdong power grid, Hubei western Hubei power grid and East China Anhui power transmission grid, two strategies of group transmission and layered transmission can be considered.

1) Group delivery

Group transmission means that the power supply is connected to different power transmission

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
channels and sent out separately through different power transmission channels. There is no connection or weak connection between channels.By sending out in groups, different power sources are divided into different groups. The function orientation of power supply is more clear, and the power flow direction is clearer. Unnecessary electrical connection and regional grid strengthening are effectively avoided, such as the western Inner Mongolia power grid and Guangdong Eastern Guangdong power grid.

Western Mongolia power grid is an important power transmission terminal of China's west to East power transmission. It not only undertakes the power supply task of six cities and two leagues in western Inner Mongolia, but also undertakes the mission of power transmission to Tianjin, Hebei and Shandong areas in Beijing.Mengxi power grid is connected with North China power grid through 500kV Hangu double circuit line and Fengwan double circuit line. The internal power supply is distributed into three horizontal channels, and the three channels are connected by longitudinal tie lines.

Compared with the Pearl River Delta region, the economic and load growth of eastern Guangdong is slightly slower, and the installed power supply capacity is more. At present, three East, middle and South transmission channels of Jiaying Shangzhai BOLUO, Shantou Rongjiang Lufeng Maohu Huizhou and Lugang Qihang Zhenzhou have been formed.In the future, Lufeng nuclear power plant, jiahuwan power plant and other large-scale power sources will be added in eastern Guangdong, and a fourth East to west power transmission channel is planned to be added.Because the power supply in East Guangdong is not all concentrated at the end of the power grid, the power grid at the end of East Guangdong can maintain contact through longitudinal channels.

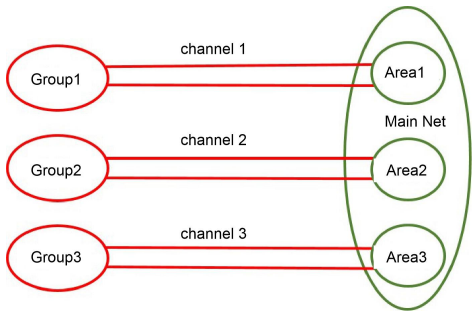

Fig.3 Schematic diagram of typical group sending structure

2) Layered delivery

Layered transmission is to plan double-layer three-dimensional power grid, and different power sources are connected to different layers of power grid.Through layered transmission, the power grid is divided into two parts, and the two power grids are relatively independent. The remote electrical connection can effectively reduce the electrical connection between the systems, and effectively solve the problem of short-circuit current exceeding the standard.Such as Hubei East China Anhui power transmission network and Western Hubei power grid.

The transmission channel of Anhui power grid will be located in one UHV channel on the basis of 4 500 kV channels across the river and 3 500 kV channels for semi external transmission, two platforms of "Anhui power transmission to the East" with similar transmission capacity and high safety and reliability are formed.Among them, the east channel of platform 1 and the second channel of middle section are a group, and Guangde substation and Dangtu substation are important hub stations, respectively connecting with Pingyao substation of Zhejiang power grid and Ningnan substation of Jiangsu power grid;Platform 2 is composed of west channel and central channel 1, with Heli substation and suoku substation as important hub stations, respectively connecting with Fuyang substation of Zhejiang power grid and dongshanqiao substation of Jiangsu power grid.

The Three Gorges power transmission system and Gezhouba power transmission system affect each other, which restricts the development of Hubei power grid. At the same time, due to the centralized connection of hydropower, the short-circuit current of Jiangling and Douli stations in Western Hubei exceeds the standard.Therefore, according to the Hubei power grid planning, in the

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
long term, Hubei western Hubei power grid will build a dual power grid from the Three Gorges and Gezhouba on the basis of the existing grid structure. There is no electrical connection between the sending ends, and the receiving end is connected to the East Hubei double loop network, which can greatly reduce the short-circuit current level of Douli and Jiangling stations, and improve the security and reliability of the system.

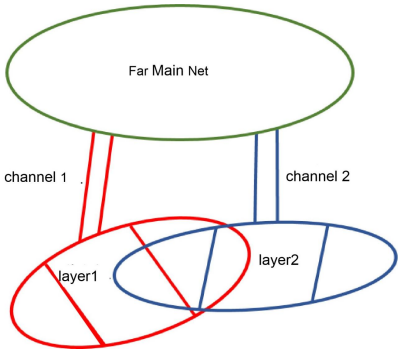

Fig.4 Schematic diagram of typical layered conveying structure

5. Power Transmission Strategy in Guangxi Coastal Areas

There are various types of power sources in Guangxi coastal areas, including coal-fired power, nuclear power and offshore wind power. The installed scale of power supply is large, and more power needs to be sent out.On the one hand, the power grid construction in coastal areas should build a strong and adaptable self-use grid to improve the power supply capacity between coastal cities;On the other hand, it is necessary to build a clear and reliable external transmission network frame, clarify the strategy and mode of power transmission, and reasonably strengthen the connection between coastal power grid and Guangxi main network.

According to the analysis of power transmission strategy in power gathering areas, it is most appropriate to adopt 500 kV AC technology in coastal areas of Guangxi, and for 500 kV AC transmission scheme, Guangxi can refer to two strategies: group transmission and layered transmission.

5.1 Strategy of Sending out by Groups in Coastal Areas of Guangxi

Taking 2050 as the level year, all large-scale power sources of Qinbei defense will be sent out in different channels.Relying on the denominator of Bailong nuclear power plant, Hongsha nuclear power plant and danzhujiang nuclear power plant, Qinbei anti-corrosion power grid is mainly divided into four transmission channels: four units of Bailong nuclear power plant are directly supplied to Chongzuo area;The other two are combined with four units of Fangchenggang power plant and Hongsha nuclear power plant, and the surplus power is sent to Nanning for consumption;The other two units of Hongsha nuclear power plant, Qinzhou Power Plant and danzhujiang nuclear power plant are combined into one piece, and the surplus power is sent to Guigang, Yulin and other places;The remaining 4 units of danzhujiang nuclear power plant are combined with Beihai power plant to supply power to Yulin and Wuzhou.In this way, the wiring diagram of Guangxi coastal power grid in 2050 is shown in Figure 4.The coastal area is divided into four channels, except for the weak connection between Jiulong and Beihai, there is no connection between other channels. The grid structure is clear, and the power transmission direction of each power supply is clear.Through research, calculation and analysis, the grid structure scheme can better meet the demand of power transmission, the system has no related stability problems, and the short-circuit current of each substation is controlled in a reasonable range.

5.2 Strategy of Layered Transportation in Coastal Areas of Guangxi

Taking 2050 as the level year, the main external power sources along the coast of Guangxi constitute one layer of power grid, which is transmitted to the central Guangxi power grid in a

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752
point-to-network manner. The local power supply and coastal power grid constitute another layer of power grid, forming a grid like grid scheme.Bailong nuclear power plant and danzhujiang nuclear power plant are the main sources of coastal transportation. Six units of Bailong nuclear power plant are directly connected to Chongzuo and Nanning;Four units of danzhujiang nuclear power plant are directly connected to Guigang and Yulin areas;Fangchenggang nuclear power plant, danzhujiang nuclear power plant and qinbeifang thermal power unit are combined into one piece, which mainly meets the local power supply demand of Qinbei defense. A small amount of surplus power is sent out through Hongsha nuclear power plant Nanning, Haigang Yongzhou, Lingshan Meilin and Shenhua Beihai power plant Meilin.Through the research, calculation and analysis, the hierarchical transmission scheme can also meet the demand of power transmission, and the system has no related stability problems. The short-circuit current of each substation can meet the system requirements.

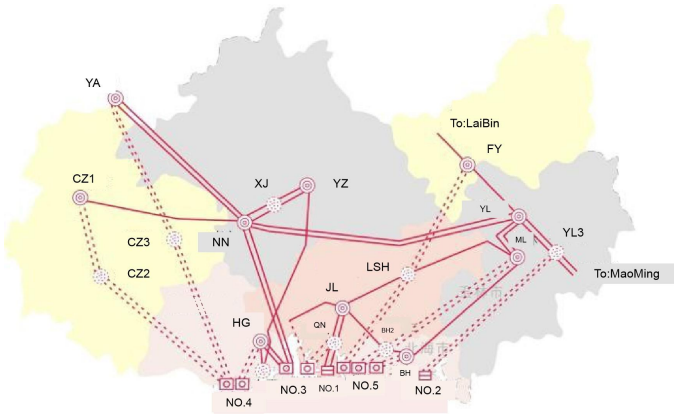

Fig.5 Schematic diagram of grid structure sent out by groups in coastal areas of Guangxi

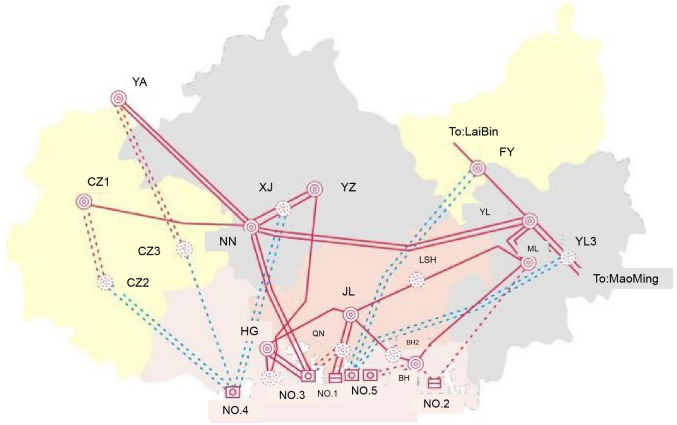

Fig. 6 Schematic diagram of layered transmission grid in Guangxi coastal area

6. Conclusion

This paper analyzes the causes of power supply aggregation in China.In view of the common problems of power gathering places, the paper puts forward decentralized power supply access, reasonable grid structure scheme and equipment installation to solve the related problems.It is proposed that the core problem of power gathering area is to find the appropriate power transmission strategy to effectively connect the different requirements of grid construction between regional power consumption and power transmission.Combined with the typical domestic power grid structure, two network construction strategies are proposed, which are group sending and layered sending.Finally, taking the power transmission of Guangxi coastal power grid as an example, the specific power transmission scheme is given, and the feasibility and rationality of the two ideas are illustrated.

ISSN:2790-1688 DOI: 10.56028/aetr.3.1.752

References

[1] Yu Liangchun, Dong Liwa. Analysis of regional distribution and power supply structure of China's power industry [J]. Dongyue monograph, 2003,24 (3): 63-66

[2] Research group of power development and layout of China Electric Power Enterprises Federation. Research on power development and layout in China [J]. Electrical industry, 2015 (8): 46-48

[3] Gao Chao, Guo Qiang, Zhou QinYong, Shi Haobo, Qin Qin. Security and stability of large-scale new energy transmission in the 13th five year plan [J]. China electric power, 2017, 50 (1): 37-42

[4] Zhang Hong, LV Rui, Zhu Minghui, Chen Yefu. Analysis of Shaanxi power transmission [J]. Power grid analysis and research, 2018,46 (3): 44-48

[5] Niu Jirong. Inner Mongolia power transmission mode [J]. China electric power, 2009,42 (10): 52-55